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Out-of-Plan Use Under Two Prepaid Plans

Membership Duration and Utilization Rates in a Prepaid Group Practice

Determining the Generalizability of Rating Scales in Clinical Settings

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MEDICAL CARE
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Original Articles

Out-of-Plan Use Under Two Prepaid Plans

ANNE A. SCITOVSKY, M.A.,* LEE BENHAM, PH.D.,† AND NELDA MCCALL, M.A.‡

This analysis of out-of-plan use of physician and paramedical services under a Kaiser plan and under a prepaid option offered by a predominantly fee-for-service group practice (Clinic plan) deals primarily with services that members could have obtained from plan providers ("covered services"). The extent and pattern of out-of-plan use were found to be similar. While 16–20 per cent of plan members used some out-of-plan covered services and the mean number of such services was about one half visit per member per year, most out-of-plan users were occasional users, 10–12 per cent of users (or 2 per cent of plan members) accounting for 50 per cent of all out-of-plan covered services. The principal member characteristics associated with out-of-plan use were dissatisfaction, health status and having other insurance. The literature on out-of-plan use is also reviewed.

NO EVALUATION OF THE PERFORMANCE of a prepaid health plan, or Health Maintenance Organization (HMO), and especially no comparison of the performance of different plans, is complete without an exploration of out-of-plan use of medical services by plan members. If there is substantial out-of-plan use, or greater out-of-plan use under one plan than another, the in-plan utilization figures are misleading. Even more important, it has been suggested that out-of-plan use may be the reason that HMOs are able to provide medical care more economically than the fee-for-service system. Members of HMOs, so the argument goes, get their day-to-day medical care from the HMO but in case of more serious illness consult nonplan physicians.

In this article, we analyze out-of-plan use under two prepaid plans, on which we conducted a study to explore the performance of two different HMO-type organizations. Other findings of this study have been published in previous issues of this journal.[1–3] The principal questions that this article addresses are the magnitude of out-of-plan use in terms of the number of out-of-plan users as well as of out-of-plan services, the characteristics of out-of-plan users, the types of out-of-plan ser-

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vices used and out-of-pocket expenses for out-of-plan services. The article also discusses the problem of defining and measuring out-of-plan use, which has troubled the literature on the subject, and compares our findings with those of other studies of out-of-plan use.

Description of the Plans

Since the two plans have been described in detail in our previous articles,§ only a brief summary of their main features will be given here. They are basic health care plans offered by Stanford University to its employees and their families.[¶] One is a Kaiser plan, the other is United Medical Clinics/Blue Cross plan (hereafter referred to as Clinic plan). Under this plan, physician services and outpatient ancillary services are provided by the Palo Alto Medical Clinic (PAMC), a multispecialty, predominantly fee-for-service group practice of about 125 physicians, and hospital services are covered by a Blue Cross policy. The benefit provisions of the two plans are almost identical, covering most medical services in and out of the hospital, the main exclusions being psychiatric care and, in the case of the Clinic plan, routine eye examinations. The main difference between the plans, in addition to the difference in the organizational structure of the providers, lies in their cost-sharing provisions. While the Kaiser plan has no cost sharing beyond a $1 charge for a physician office visit and $3.50 for a home visit, the Clinic plan has a 25 per cent co-insurance provision that applies to all physician services and to outpatient ancillary services. This means that the marginal cost of going outside the plan for a service obtainable under the provisions of the plan is lower for Clinic plan members than for Kaiser plan members. Other things being equal, we would therefore expect greater use of out-of-plan services by Clinic than by Kaiser plan members.

In addition to its basic health plans, Stanford University also provides a major medical insurance policy that employees obtain free of charge as a fringe benefit. Dependents can be enrolled for a monthly premium, which at the time of our study was $5 if they were members of one of the basic health plans and $7 if they were not members. After a deductible of $100 for basic plan members and $500 for nonmembers, it pays 80 per cent of most medical and hospital expenses, including some costs not covered by the basic plans, such as drugs and prescriptions. Enrollees in the basic health plans are required to use these plans for covered services before resorting to their major medical coverage. The policy will, however, pay for such services when obtained from an out-of-plan source, but only after a deductible of $300—rather than the $100 applicable to basic plan members for other medical expenses—has been met.

Study Population and Methodology

The study population consists of 2,061 Kaiser and 2,139 Clinic plan members who were covered by the plans during the full 12 months from July 1973 through June 1974 and who in addition participated in an initial household interview and three follow-up telephone interviews over the 12-month period. The selection of this population has been described in detail in one of our earlier articles.[1] The distribution of the two groups by various demographic, socioeconomic and health-related characteristics, also described at length in our earlier articles,[1,2] is shown in Table 1. The principal differences between the two groups that may be of note here are the

§ See especially reference 1.

¶ Stanford University also offers a third basic plan, a standard Blue Cross medical/hospital policy, which is not included in this study.

higher socioeconomic status of Clinic plan members in terms of family income, education and occupation; the higher proportion of older members and of members covered by Stanford's major medical insurance among Clinic plan enrollees; the larger percentage of dissatisfied Kaiser plan members and of Kaiser plan members covered by additional insurance other than Stanford's major medical insurance; and the shorter average length of plan membership of Kaiser plan members. There is little difference, however, in the health status of the two groups as measured in terms of self-assessment, per capita number of in-plan physician (and physician plus paramedical) services, and number of hospital days per 1,000 plan members.*

Data were collected for the 12-month period from July 1973 through June 1974. While data on in-plan use were obtained from the plan members' medical records, data on out-of-plan use were collected in an initial household interview and three follow-up telephone interviews held at 3-month intervals. Respondents who reported an out-of-plan service were asked the date of the service, the name of the provider (so that it was possible to establish whether the provider was a physician or some other health service professional), the reason for going outside the plan, the condition for which out-of-plan care was sought and the type of service obtained, the place of the service, the number of visits and out-of-pocket expenses, if any. The initial household interviews also furnished information on marital status of the subscriber, family income, education and occupation of the head of the household, additional insurance coverage, attitudes concerning medical care, satisfaction with the plans, health status and regular source of care.

* For our study of hospital utilization, we used a larger study population; see reference 3.

Definition and Measurement of Out-of-Plan Use

Before discussing our findings, it is necessary to say a few words about the problem of defining and measuring out-of-plan use. While there have been quite a few studies of out-of-plan use under prepaid plans,[4–22] either dealing specifically with the subject or touching on it within the framework of a broader discussion of particular plans, the results have on the whole been disappointing and confusing.¶ The reason for this unsatisfactory state of affairs is that there exists neither a common definition of what constitutes out-of-plan use nor agreement on how to measure it.

In many studies of out-of-plan use, it is not made clear what the term encompasses. In most of them it seems to be implied that an out-of-plan service is any service obtained by a plan member from a nonplan physician and, in some instances, from some other type of health professional, such as a chiropractor. A few studies actually define it as such.[11,19] Thus, in most studies, three different types of out-of-plan use are combined: 1) services not covered by the plans and not paid for by them; 2) services covered by the plans that plan members obtained from nonplan providers but that the plans paid for (e.g., services when members were temporarily out of the area, emergency services, and referrals by the plans to outside providers); and 3) services covered by the plans that plan members elected to obtain from nonplan providers and for which the plans did not pay. Adding to the confusion is the fact that some studies appear to be limited to out-of-plan use of physician services, while others include the services of other health professionals, and that telephone consultations are included in some studies but excluded in others.

¶ For a good review of the literature, see reference 17.

TABLE 1. Selected Characteristics of Kaiser and Clinic Plan Members

Member Characteristics	Percentage of All Members*			
	Kaiser	(N)	Clinic	(N)
All members	100	(2061)	100	(2139)
Sex				
Male	49	(1014)	48	(1036)
Female	51	(1047)	52	(1103)
Membership status				
Subscriber				
Male	29	(590)	29	(625)
Female	16	(336)	12	(265)
Spouse				
Male	2	(50)	2	(34)
Female	17	(344)	21	(453)
Dependent				
Male	18	(374)	18	(377)
Female	18	(367)	18	(385)
Age				
Under 15	28	(581)	27	(587)
15–44	53	(1094)	41	(882)
45–64	18	(377)	31	(663)
Unknown	<1	(9)	<1	(7)
Marital status of subscribers and spouses†				
Married subscriber	31	(643)	32	(674)
Married spouse	19	(388)	23	(483)
Never married	7	(142)	5	(97)
Widowed, divorced, separated	7	(147)	6	(123)
Family income				
Under $10,000	22	(452)	8	(157)
$10,000–24,999	71	(1470)	53	(1130)
$25,000+	6	(123)	40	(833)
Unknown	<1	(16)	<1	(19)
Occupation of household head				
Faculty	8	(167)	39	(843)
Other professional staff	40	(832)	45	(960)
Nonprofessional staff	52	(1061)	16	(336)
Unknown	<1	(1)	—	(—)
Education of household head				
High school graduate or less	23	(467)	7	(140)
Some college or college graduate	41	(846)	23	(491)
Some postgraduate work or graduate degree	36	(744)	70	(1507)
Unknown	<1	(4)	<1	(1)
Covered by Stanford Major Medical Insurance				
Yes	66	(1352)	93	(1980)
No	34	(709)	7	(149)
Covered by outside insurance other than Stanford Major Medical				
Yes	12	(237)	9	(189)
No	88	(1824)	91	(1950)

TABLE 1. (Continued).

Member Characteristics	Percentage of All Members*			
	Kaiser	(N)	Clinic	(N)
Satisfaction with the plan				
Completely satisfied	28	(571)	36	(770)
Generally satisfied	61	(1249)	58	(1248)
Not satisfied	11	(223)	6	(118)
Unknown	<1	(18)	<1	(3)
Health status				
Excellent	59	(1209)	63	(1351)
Good	34	(709)	31	(665)
Fair	6	(130)	5	(106)
Poor	<1	(11)	<1	(14)
Unknown	<1	(2)	<1	(3)
Had one or more hospitalizations in 12-month period				
Yes	3	(66)	4	(82)
No	97	(1995)	96	(2057)
Number of in-plan physician and paramedical visits for illness in 12-month period				
None	31	(638)	28	(590)
1–2	32	(651)	32	(690)
3–5	20	(419)	23	(501)
6 or more	17	(353)	17	(358)
Number of family members covered				
1	23	(466)	16	(342)
2	15	(308)	18	(384)
3–4	37	(771)	45	(961)
5 or more	25	(516)	21	(452)
Number of years in plan				
1	7	(140)	3	(59)
2–4	46	(950)	21	(444)
5–9	47	(971)	25	(545)
10 or more	—	(—)	51	(1091)
Regular source of care				
Specific plan physician	42	(870)	87	(1865)
Plan, no specific physician	51	(1051)	10	(211)
Outside physician	3	(52)	1	(23)
No regular source of care	4	(88)	2	(40)

* Per cents may not add to 100 because of rounding.
† Dependent children are not included.

One of the few studies in which it is clearly stated which type of out-of-plan use is being examined is the study by Pope et al.[18] dealing with outside use of physicians by members of the Portland, Oregon, Kaiser plan. The authors distinguish four types of out-of-plan services: 1) services neither covered by the plan nor available at Kaiser; 2) services not covered but available at Kaiser; 3) services covered by the plan but not available at Kaiser, for which physicians outside the Kaiser system are utilized; and 4) services available at Kaiser and covered if received there. It is this last category—services for which a "decision was made *not* to use Kaiser though the services were available and would have been covered"—with which their study deals. The authors add, "This category would logically include those services which have been received, for example, at work or school as a matter of company or school policy." They do not include these in their study, however, mainly because only about 1 per cent of the study population reported some service of this type during the 12 months covered by the study.

In addition to the problem of how to define out-of-plan use, there is the problem of how to measure it. Luft[17] shows this problem to have three major aspects: the unit of measurement, the unit of observation and the time period covered. Some studies use outside users as the unit of measurement, others outside services, with only a few looking at both. Similarly, some studies use the family as the unit of observation, others the individual plan member. Finally, some studies examine outside use during a specific time period, such as the previous year, while others refer to outside use during the entire period of an individual's membership in the plan. It is not surprising that, as a result of these definitional and measurement problems, the picture of outside utilization under prepaid plans that has emerged from the existing studies is blurred and confusing.

In this study, we define out-of-plan use as all medical services other than telephone consultations obtained from nonplan physicians and paramedical personnel, except those for which the plans paid (i.e., emergency services, services when members were temporarily out of the area and referrals by the plans). We distinguish between two types: 1) out-of-plan services not covered by the plans and not paid for by them and 2) out-of-plan services that would have been covered by the plans had they been obtained from plan providers but that the plan member elected to obtain from an outside provider and for which the plans did not pay. The principal services in the first category are psychiatric services, some paramedical services not covered by the plans, notably chiropractors' services, and, in the case of the Clinic plan, routine eye examinations. We shall refer to the first type of out-of-plan services as noncovered services and to the second as covered services.

In the case of covered out-of-plan services, we make a further distinction between those services for which plan members paid and those for which they did not pay. For want of a better term, we shall refer to the second group as "free" services, while the term "covered" services will include both "free" and paid-for services. "Free" services in this study consist largely of services obtained at public clinics, free of charge because of professional courtesy, at no cost under public programs (e.g., Worker's Compensation, Veterans Administration and CHAMPUS), and by employees of the Stanford Linear Accelerator (SLAC) at its on-premise facility.** They also include some services paid

** Our study population of 4,200 plan members includes 323 SLAC employees, of whom 212 were Kaiser plan members (representing 10.3 per cent of the Kaiser plan population) and 111 were Clinic plan members (representing 5.2 per cent of the Clinic plan population). We duplicated the entire analysis excluding the SLAC employees and found that this did not alter our principal findings.

for by other insurance, such as duplicate policies obtained by plan members through their spouses' employment, student health policies of dependent children and a few instances of insurance of other persons (e.g., liability insurance of another person in cases of accidents).

Our analysis will focus primarily on out-of-plan use of covered physician and paramedical services. While out-of-plan use of noncovered services is of interest mainly because it indicates the extent to which the benefit package of a plan meets—or fails to meet—the needs of plan members, out-of-plan use of covered services raises questions about both the performance and the membership of prepaid plans. The basic question is why persons who join a comprehensive prepaid plan would go to nonplan providers at all for services they could obtain from plan providers at no cost, or at no cost beyond the copayment required by the plan. Is such out-of-plan use mainly an indication of dissatisfaction with the plan, or does it represent something else? What are the characteristics of persons who go outside the plan for services they could obtain from plan providers? Who are the heavy users of such out-of-plan services? What are the reasons given by out-of-plan users for going outside the plan? These are some of the questions we shall try to answer.

The analysis will also be carried out largely in terms of all covered physician and paramedical services, including "free" services. In contrast with the findings of Pope,[18] we found (as can be seen in Table 3) that the extent of out-of-plan use of "free" covered services was by no means negligible, either in terms of the percentage of members with such out-of-plan services or of the number of such services per member. Our principal interest is in the *total* use of medical services by members of the two plans. Omitting the "free" services would therefore have given an inaccurate picture of overall use, since it is quite likely that in their absence, in-plan use or other out-of-plan use would have been higher, though not necessarily by the full amount of the "free" services. However, we have duplicated the entire analysis for covered out-of-plan services excluding "free" services and present the results in our tables.

We have included services by paramedical personnel in our analysis because, as in the case of "free" services, their omission would have given a somewhat distorted picture. This is because Kaiser plan members obtained a substantially higher proportion of their out-of-plan services from paramedical personnel than did Clinic plan members. The relevant figures are shown in Table 2. It is clear that out-of-plan use of covered services by Kaiser plan members, as compared with that of Clinic plan members, would have been understated if paramedical services had not been included.

Our analysis will be in terms of both out-of-plan users and out-of-plan services in the 12-month period from July 1973 through June 1974. After an overview of our findings, we shall begin by examining the out-of-plan users: how many are there, what are their characteristics, what differences are there between the two groups? This discussion will be followed by an analysis of out-of-plan services: how many are there, how are they distributed among different users, who are the heavy users? Next will come a review of the reasons

TABLE 2.

Per cent of Covered Out-of-Plan Physician and Paramedical Services Obtained from Paramedical Personnel

	Kaiser Plan Members	Clinic Plan Members
All covered services	10.1	4.2
Covered excluding "free" services	6.3	.5
"Free" services	15.5	10.2

given by plan members for going outside the plan for covered services. The use of noncovered services will be dealt with briefly in the next section, followed by a short section on out-of-pocket expenses for both covered and noncovered services. In a final section, we shall evaluate our findings in the light of those of other studies on out-of-plan use.

Findings

Overview

The basic findings of the study are summarized in Table 3. It shows that 25.2 per cent of Kaiser plan members and 31.7 per cent of Clinic plan members had at least one out-of-plan covered or noncovered physician or paramedical service during the 12-month period of the study. If Clinic plan members whose only out-of-plan service was a routine eye refraction (which is a covered service under the Kaiser plan but a noncovered service under the Clinic plan) are omitted, the Clinic plan percentage drops to 20.8 per cent, slightly below the Kaiser percentage. The percentage of out-of-plan users of covered services was somewhat higher among Kaiser than Clinic plan members, with 20.3 per cent of Kaiser and only 15.6 per cent of Clinic plan members reporting at least one such service. This difference also holds true when we separate covered services into "free" services and services for which members paid a fee: 11.5 per cent of Kaiser and 9.1 per cent of Clinic plan members went outside the plan for at least one covered service for which they had to pay, with corresponding figures for "free" services of 9.9 per cent and 7.4 per cent, respectively. Thus, our hypothesis that Clinic plan members would be more likely to go outside the plan for covered services is not borne out by the data. While a substantially higher percentage of Clinic than Kaiser plan members used noncovered services—19.7 per cent compared with 6.7 per cent—the Clinic plan figure is 6.0 per cent if Clinic plan members whose only noncovered service was a routine eye refraction are excluded.

In terms of the number of out-of-plan physician and/or paramedical services per 100 plan members during the 12-month period, total out-of-plan use of covered and noncovered services by the two groups was

TABLE 3. Per cent of Kaiser and Clinic Plan Members With at Least One Out-of-Plan Physician or Paramedical Service and Number of Out-of-Plan Services (July 1973 to June 1974)

Type of Service	% with at Least One Out-of-Plan Service		No. of Out-of-Plan Services per 100 Members	
	Kaiser	Clinic	Kaiser	Clinic
	100.0 (N = 2061)	100.0 (N = 2139)		
All out-of-plan services	25.2	31.7 (20.8)*	163	165 (148)†
Covered services	20.3	15.8	62	50
Covered services excluding "free" services	11.5	9.1	36	31
"Free" services	9.9	7.4	26	19
Noncovered services	6.7	19.7 (6.0)*	101	115 (98)†

* Excludes members whose only noncovered out-of-plan service was a routine eye refraction.
† Excludes routine eye refractions.

almost identical, 163 such services for Kaiser and 165 for Clinic plan members. However, if routine eye refractions of Clinic plan members are excluded, the Clinic plan figure is reduced to 148 services per 100 members. As in the case of the percentage of members who used at least one out-of-plan covered service, Kaiser plan members were also somewhat heavier users than Clinic plan members in terms of the number of such services per 100 members, with the Kaiser figure of 62 compared with the Clinic figure of 50. Again, our hypothesis that Clinic plan members would be heavier out-of-plan users is not borne out by our findings. The difference between the two groups is somewhat more pronounced in the case of "free" services than of services for which members had to pay. Kaiser plan members had 26 "free" services per 100 plan members, as compared with only 19 for Clinic plan members, while the figures for out-of-plan covered services for which members had to pay were closer, amounting to 36 and 31 per 100 members, respectively. Finally, while Clinic plan members used more noncovered services (115 compared with 101 per 100 members), their rate of use of such services is much the same as the Kaiser rate when routine eye refractions are excluded from the Clinic figures.

When the out-of-plan use data are placed in the context of total medical care use of the two groups, as is done in Table 4, which combines our data on in-plan and out-of-plan use of physician and paramedical services, the similarities between the two groups are striking. The per capita number of all medical services was practically identical: 5.58 for Kaiser and 5.55 for Clinic plan members. Both groups obtained about 70 per cent of all their physician and paramedical services from plan providers and 30 per cent from nonplan providers. Just over 11 per cent of the services obtained by Kaiser plan members and 9 per cent of those obtained by Clinic plan members were services obtained from out-of-plan providers that could have been obtained from plan providers under the terms of the plans.

In addition to out-of-plan physician and paramedical services, both groups also had a small number of out-of-plan hospital stays. Kaiser plan members had nine (4.4 per 1000 members) and Clinic plan members eight (3.7 per 1000 members) hospital admissions for noncovered services; of these, five each were psychiatric hospitalizations. While the Clinic group had no out-of-plan hospital admissions for covered services, the Kaiser group had seven (3.4 per 1000 members), totalling 32 hospital

TABLE 4. Per Capita Number and Percentage Distribution of In-Plan and Out-of-Plan Physician and/or Paramedical Services (July 1973 to June 1974)*

Type of Service	Per Capita No. of Services				% of Services			
	Kaiser		Clinic		Kaiser		Clinic	
In-plan services	3.95	(3.59)	3.90	(3.83)	70.8	(76.5)	70.3	(74.4)
Out-of-plan services	1.63	(1.10)	1.65	(1.32)	29.2	(23.5)	29.7	(25.6)
Covered	.62	(.56)	.50	(.48)	11.1	(11.9)	9.0	(9.3)
Noncovered	1.01	(.54)	1.15	(.84)	18.1	(11.5)	20.7	(16.3)
TOTAL	5.58	(4.69)	5.55	(5.15)	100.0	(100.0)	100.0	(100.0)

* Figures in parentheses refer to physician services only.

days (15.5 per 1000 members). Reasons given for these hospitalizations were emergency care (two cases), "too long to get appointment" (two cases), "too far away" (one case) and "preferred outside physician" (two cases).

Covered Services: Characteristics of Users

To turn to the detailed analysis of out-of-plan use of covered services, Tables 5 and 6 present our findings on the characteristics of out-of-plan users of these services. Table 5 shows the percentage of plan members with at least one out-of-plan covered physician or paramedical service by selected member characteristics. The figures in the first two columns refer to plan members with either type of out-of-plan covered service, paid for or "free," and, as stated earlier, our analysis will focus on this group. However, we also show, in the other two columns, the same data excluding plan members whose only out-of-plan covered services were "free" services. Table 6 presents the results of the multivariate analysis.†† The dependent variable is a dummy variable that is equal to one if the individual had one or more out-of-plan physician or paramedical services and zero if he had no such services. The independent variables are the member characteristics shown in Table 5 except regular source of care, occupation and education.‡‡ All of these except number of family members covered and number of in-plan physician and paramedical services for illness are separated into discrete intervals and enter the equation as dummy variables. Within each set of dummy variables, one category is excluded (e.g., male subscriber), and the coefficients of the remaining dummy variables in each set can be regarded as indicating the probability of being an out-of-plan user with reference to the excluded category. As in Table 5, the first two columns refer to out-of-plan users of all covered services, the other two only to those members who used services for which they had to pay.

Because the cross tabulations of Table 5 and the multivariate analysis of Table 6 show much the same association between member characteristics and being an out-of-plan user, we shall discuss this subject mainly on the basis of the multivariate analysis. It should be noted, however, that Table 5 also shows not only that the Clinic plan group as a whole had a smaller proportion of out-of-plan users than the Kaiser plan group (which we already noted in Table 3) but that this was true for most of the subgroups as well. Among the few exceptions are plan members who reported their health as fair or poor, and members who had one or more hospitalizations in the 12-month period. Clinic plan members with these characteristics had a considerably higher percentage of out-of-plan users than the corresponding Kaiser plan groups.

The multivariate analysis presented in Table 6 shows that for both groups, holding other factors constant, the member characteristics significantly associated with going outside the plan for covered services were satisfaction with the plans, having outside insurance, number of family members covered and length of plan membership. In addition, several other characteristics—membership status, age, marital status and health status—showed some significant relationship with outside use for one group but not the other.

For both groups, satisfaction with the plan was one of the most important factors associated with being an out-of-plan user. Kaiser plan members who were not satis-

†† We also calculated logit estimates in place of one of the equations and found that they gave very similar results.

‡‡ We excluded regular source of care because of colinearity between having an out-of-plan physician as regular source of care and using an out-of-plan physician. We omitted occupation and education because after running various regressions using different combinations of the three socioeconomic variables, we found that it made little difference which variable we used, and we selected family income.

fied were 16.5 per cent more likely and Clinic plan members 10.8 per cent more likely to be out-of-plan users than members who were completely satisfied. These differences are not only statistically significant but relatively large, considering that the average Kaiser plan member had only a 20.3 per cent and the average Clinic plan member a 15.8 per cent probability of being an out-of-plan user. Even plan members who were generally (but not completely) satisfied were slightly but significantly more likely to use out-of-plan services, the probabilities being 5.7 per cent for Kaiser and 3.6 per cent for Clinic plan members.

Having additional health insurance other than Stanford University's major medical insurance is another factor strongly and significantly associated with going outside the plan for both groups. Kaiser plan members without such additional insurance were 11.1 per cent less likely and Clinic plan members 10.2 per cent less likely to be outside users than members who had such insurance. It is not clear why coverage by Stanford University's major medical insurance was found to have no relationship to out-of-plan use. One possible explanation is member ignorance. Stanford University employees who work at least 75 per cent of full time get this insurance automatically and at no cost to themselves. The household interviews revealed that a surprising number of subscribers were unaware that they were covered by it. In addition, the $300 deductible applicable under the major medical policy when plan members obtain a covered service from a nonplan provider makes the policy irrelevant for the occasional out-of-plan user.

The data in Table 6 also show a small but significant inverse relationship between number of family members covered and going outside the plan. For every additional family member covered, the probability of being an out-of-plan user declined 2.0 per cent in the case of Kaiser plan members and 1.5 per cent in the case of Clinic plan members. A similarly small but significant relationship was also found between length of plan membership and out-of-plan use. Members of both plans who had been covered by them less than five years were 4.7 per cent more likely to use some outside services than those who had been members longer.

The relationship between membership status and being an out-of-plan user is somewhat different for the two groups. Both Kaiser and Clinic plan male spouses were the least likely to be out-of-plan users, the probability being 21.0 per cent less for Kaiser and 14.1 per cent less for Clinic plan male spouses than for male subscribers. But while Kaiser plan female spouses and male and female dependents also were significantly less likely to go outside the plan, this was not found to be the case for the corresponding Clinic plan groups. On the other hand, while Kaiser plan male and female subscribers were equally likely to be outside users, Clinic plan female subscribers were 7.8 per cent more likely to use outside services than male subscribers, a statistically significant difference.

The relationship between age and being an outside user is also slightly different for the two groups. While in both groups the youngest age group (under 15 years) was found to be less likely to go outside the plan than the oldest group (45–64 years), the difference is statistically significant only for Kaiser plan members. But in both groups, there was no difference in the probability of out-of-plan use between the 15–44 age group and the oldest group. Marital status and being an out-of-plan user showed no relationship for Clinic plan members, but Kaiser plan never-married members were 10.3 per cent more likely to go outside the plan than married members, a statistically significant difference, while the probability of out-of-plan use was the

TABLE 5. Per Cent of Kaiser and Clinic Plan Members with at Least One Out-of-Plan Covered Physician or Paramedical Service (July 1973 to June 1974)

Member Characteristics	Covered Services		Covered Excluding "Free" Services	
	Kaiser	Clinic	Kaiser	Clinic
All members	20.3	15.8	11.5	9.1
Sex				
Male	20.3	15.6	8.9	7.4
Female	20.3	16.0	14.0	10.7
Membership status				
Subscriber				
Male	27.6	17.4	9.5	7.8
Female	33.3	14.7	23.8	8.3
Spouse				
Male	8.0	8.8	4.0	8.8
Female	18.0	19.0	12.8	15.0
Dependent				
Male	10.4	13.3	8.6	6.6
Female	10.6	13.2	6.3	7.3
Age				
Under 15	8.4	11.1	7.4	6.8
15–44	24.2	17.7	14.1	9.1
45–64	26.8	17.6	9.8	11.3
Unknown	44.4	—	33.3	—
Marital status of subscribers and spouses*				
Married subscriber	28.0	16.0	12.6	7.9
Married spouse	17.0	18.4	11.9	14.7
Never married	40.1	18.6	24.6	9.3
Widowed, divorced, separated	25.9	17.9	13.6	7.3
Family income				
Under $10,000	26.6	16.6	16.6	8.9
$10,000–24,999	18.2	16.6	9.6	9.0
$25,000 +	22.8	14.6	15.4	9.4
Unknown	25.0	15.8	12.5	5.3
Occupation of household head				
Faculty	16.8	14.6	13.2	9.5
Other professional staff	20.2	16.8	11.5	9.0
Nonprofessional staff	21.0	16.1	11.2	8.6
Unknown	—	—	—	—
Education of household head				
High school graduate or less	19.7	14.3	9.9	5.0
Some college or college graduate	20.4	15.7	11.0	9.0
Some postgraduate work or graduate degree	20.4	16.0	13.0	9.6
Unknown	50.0	—	25.0	—
Covered by Stanford Major Medical Insurance				
Yes	22.2	15.6	12.4	9.1
No	16.8	18.1	9.7	8.7

TABLE 5. (Continued).

Member Characteristics	Covered Services		Covered Excluding "Free" Services	
	Kaiser	Clinic	Kaiser	Clinic
Covered by outside insurance other than Stanford Major Medical				
Yes	32.5	25.4	15.2	10.1
No	18.8	14.9	11.0	9.0
Satisfaction with the plan				
Completely satisfied	14.4	13.2	7.0	6.9
Generally satisfied	20.5	16.7	11.5	9.9
Not satisfied	31.4	22.0	22.0	14.4
Unknown	61.1	33.3	22.2	33.3
Health status				
Excellent	18.0	14.0	10.8	7.3
Good	22.8	16.2	12.8	10.1
Fair	26.9	33.0	11.5	24.5
Poor	27.3	35.7	9.1	21.4
Unknown	50.0	33.3	—	33.3
Had one or more hospitalizations in 12-month period				
Yes	27.7	40.2	20.0	28.0
No	20.1	14.8	11.2	8.4
Number of in-plan physician and paramedical visits for illness in 12-month period				
None	23.4	13.9	12.7	8.1
1–2	17.1	17.0	8.6	7.8
3–5	19.1	11.2	11.5	7.2
6 or more	22.4	23.2	14.7	15.9
Number of family members covered				
1	34.3	18.1	18.8	8.8
2	26.0	17.4	17.9	11.7
3–4	16.6	17.3	8.8	10.4
5 or more	9.9	9.5	5.2	4.4
Number of years in plan				
1	25.0	20.3	14.3	15.3
2–4	24.4	18.2	15.5	11.9
5–9	15.7	13.6	7.2	6.4
10 or more	—	15.7	—	9.0
Regular source of care				
Specific plan physician	15.3	14.3	9.0	8.0
Plan, no specific physician	19.0	18.0	10.9	11.4
Outside physician	71.2	73.9	57.7	73.9
No regular source of care	55.7	42.5	15.9	10.0

* Dependent children are not included.

TABLE 6. Ordinary Least Squares Estimates of Probability of Using at Least One Out-Of-Plan Covered Physician or Paramedical Service (July 1973 to June 1974)

Independent Variable*	Covered Services		Covered Excluding "Free" Services	
	Kaiser	Clinic	Kaiser	Clinic
Membership status				
Subscriber				
Male	—	—	—	—
Female	.000	− .078	.104	− .017
	(0.0)	(2.55)	(4.60)	(.72)
Spouse				
Male	− .210	− .141	− .047	.000
	(3.64)	(2.19)	(1.01)	(0.0)
Female	− .062	.016	.005	.074
	(2.24)	(.70)	(2.44)	(4.14)
Dependent				
Male	− .130	.027	− .019	.036
	(2.32)	(.48)	(.42)	(.81)
Female	− .136	.030	− .048	.049
	(2.44)	(.54)	(1.07)	(1.11)
Age				
Under 15	− .122	− .073	.021	− .032
	(2.81)	(1.81)	(.60)	(1.00)
15–44	− .024	.000	.038	− .016
	(.94)	(0.0)	(1.88)	(.97)
45+	—	—	—	—
Unknown	.090	− .216	.168	− .125
	(.69)	(1.57)	(1.60)	(1.15)
Marital status†				
Married	—	—	—	—
Never married	.103	.006	.061	− .008
	(2.63)	(.13)	(1.94)	(.22)
Widowed, divorced, separated	.002	.011	− .004	− .018
	(.07)	(.33)	(.16)	(.69)
Income				
Under $10,000	− .037	.023	− .055	− .009
	(.87)	(.60)	(1.63)	(.29)
$10,000–24,999	− .028	.022	− .054	− .009
	(.77)	(1.30)	(1.84)	(.66)
$25,000 +	—	—	—	—
Unknown	.101	− .009	− .012	− .065
	(.98)	(.11)	(.14)	(.99)
Covered by Stanford Major Medical Insurance				
Yes	—	—	—	—
No	.004	.017	− .012	− .017
	(.19)	(.53)	(.79)	(.67)
Covered by outside insurance other than Stanford Major Medical				
Yes	—	—	—	—
No	− .111	− .102	− .031	− .004
	(4.02)	(3.44)	(1.41)	(.17)

TABLE 6. (Continued).

Independent Variable*	Covered Services		Covered Excluding "Free" Services	
	Kaiser	Clinic	Kaiser	Clinic
Satisfaction with the plan				
Completely satisfied	—	—	—	—
Generally satisfied	.057	.036	.035	.031
	(2.87)	(2.22)	(2.22)	(2.37)
Not satisfied	.165	.108	.138	.086
	(5.36)	(3.01)	(5.57)	(3.04)
Unknown	.312	.102	.062	.191
	(3.35)	(.49)	(.83)	(1.17)
Health status				
Excellent or good	—	—	—	—
Fair or poor	.032	.144	.030	.115
	(.91)	(4.10)	(1.04)	(4.17)
Unknown	.306	.146	.123	.215
	(1.12)	(.71)	(.56)	(1.32)
Had one or more in-plan hospitalizations in 12-month period				
Yes	.065	.174	.059	.099
	(1.19)	(3.42)	(1.34)	(2.48)
No	—	—	—	—
Number of in-plan physician and paramedical visits for illness in 12-month period	.001	.003	.002	.004
	(.52)	(1.29)	(1.24)	(2.73)
Number of family members covered	.020	.015	.016	.014
	(3.11)	(2.11)	(3.12)	(2.42)
Number of years in plan				
Under 5	.047	.047	.048	.062
	(2.55)	(2.36)	(3.24)	(3.89)
5+	—	—	—	—
Constant	.373	.241	.118	.774
R^2	.100	.054	.075	.059

* All the independent variables except number of in-plan physician and paramedical visits for illness in 12-month period and number of family members covered are dummy variables equal to 1 if the individual is in the category and equal to 0 otherwise.

† Includes dependents as "never married."

same for widowed, divorced and separated members as for married members.

The relationship between health status as indicated by self-assessment, having had one or more hospitalizations in the 12-month period, and number of in-plan physician and paramedical visits for illness is also not quite the same for the two groups. While the unadjusted figures of Table 5 show an increase in the percentage of out-of-plan users as self-assessed health status worsens for both Kaiser and Clinic plan members, the adjusted figures of Table 6 show that these differences are statistically significant only for Clinic plan members. Clinic plan members who rated their health status as fair or poor were 14.4 per cent more likely to go outside the plan than members who rated their health status as excellent or good. Similarly, Clinic plan

members who had had at least one hospitalization in the 12 months of the study were 17.4 per cent more likely to be outside users than members without a hospital episode, while Kaiser plan members showed no significant difference. There appeared to be no relationship, however, for either group, between the number of in-plan physician and paramedical visits for illness and going outside the plan.

It is of interest to note that we found no association between family income and out-of-plan use. The other measures of socioeconomic status, occupation and education, also showed no relationship when we included them in the equations.

Covered Services: Volume of Services

Table 3 shows that the average number of out-of-plan covered services in the 12-month period was 62 per 100 Kaiser and 50 per 100 Clinic plan members. Table 8 presents the average number of out-of-plan covered services per user of such services (first two columns) as well as per 100 plan members (third and fourth columns) by the selected member characteristics used in Table 5. Before examining this table in more detail, however, a look at Table 7 will show at a glance that there were very few heavy out-of-plan users. This table presents the distribution of out-of-plan users of covered services by number of out-of-plan episodes and by number of out-of-plan visits, an episode being defined as one or more physician or paramedical contacts for the same condition or set of conditions. It shows that 76.1 per cent of Kaiser and 77.2 per cent of Clinic plan users had a single episode of out-of-plan care during the 12 months of the study. Similarly, it shows that 48.7 per cent of Kaiser and 50.3 per cent of Clinic plan users had only one out-of-plan physician or paramedical service, and that only 11.5 per cent of Kaiser and 9.8 per cent of Clinic plan outside users had six or more out-of-plan services. Put differently, this means that roughly 12 per cent of Kaiser and 10 per cent of Clinic plan users of out-of-plan covered services had about 50 per cent of all such services. In terms of plan members rather than out-of-plan users, the figures are even more

TABLE 7. Per Cent Distribution of Out-of-Plan Users of Covered Physician and/or Paramedical Services (July 1973 to June 1974)

	Covered Services		Covered Excluding "Free" Services	
	Kaiser	Clinic	Kaiser	Clinic
	100.0% (N = 419)	100.0% (N = 338)	100.0% (N = 237)	100.0% (N = 195)
Number of episodes				
1	76.1	77.2	80.6	82.1
2	17.7	16.6	13.5	14.4
3	3.8	3.8	4.2	2.1
4 or more	2.4	2.4	1.7	1.5
Number of visits				
1	48.7	50.3	51.1	50.8
2	21.2	20.4	19.0	21.0
3	8.4	10.1	8.0	8.7
4	5.5	5.6	5.9	5.1
5	4.8	3.8	5.1	3.1
6 or more	11.5	9.8	11.0	11.3

TABLE 8. Number of Out-of-Plan Covered Physician and/or Paramedical Services (July 1973 to June 1974)

Member Characteristics	Number of Covered Services				Number of Covered Services Excluding "Free" Services			
	Per User		Per 100 Members		Per User		Per 100 Members	
	Kaiser	Clinic	Kaiser	Clinic	Kaiser	Clinic	Kaiser	Clinic
All members	3.05	3.15	61.91	49.74	3.15	3.38	36.20	30.86
Sex								
Male	2.90	2.93	48.82	45.85	2.56	3.51	22.68	26.06
Female	3.67	3.35	74.59	53.40	3.52	3.31	49.28	35.36
Membership status								
Subscriber								
Male	2.24	2.86	61.86	49.92	2.16	3.00	20.51	23.52
Female	4.45	3.44	148.21	50.57	4.14	2.23	98.51	18.49
Spouse								
Male	12.00	22.67	96.00	200.00	20.50	22.67	82.00	200.00
Female	3.11	3.29	56.10	62.47	3.18	3.60	40.70	54.08
Dependent								
Male	2.10	1.90	21.93	25.20	2.13	2.20	18.18	14.59
Female	2.31	3.37	24.52	44.68	1.96	3.43	12.26	24.94
Age								
Under 15	2.22	2.68	18.76	29.64	2.26	3.03	16.70	20.61
15–44	2.96	3.24	71.76	57.37	3.07	3.34	43.24	30.27
45–64	3.74	3.28	100.27	57.92	4.68	3.63	45.89	41.03
Unknown	1.00	—	44.44	—	1.00	—	33.33	—
Marital status of subscribers and spouses*								
Married subscriber	2.89	3.21	81.03	51.48	3.23	3.11	40.75	24.48
Married spouse	3.65	3.95	62.11	72.67	3.93	4.41	46.65	64.80
Never married	3.21	2.56	128.87	47.42	2.63	1.78	64.79	16.49
Widowed, divorced, separated	4.18	2.41	108.16	43.09	4.90	1.67	66.67	12.20
Family income								
Under $10,000	3.48	4.15	92.26	68.79	3.61	1.64	59.96	14.65
$10,000–24,999	2.95	2.73	53.54	45.13	3.09	3.00	29.66	27.01
$25,000 +	1.71	3.62	39.02	53.06	1.53	4.22	23.58	39.50
Unknown	6.00	1.33	150.00	21.05	5.00	2.00	62.50	10.53
Occupation of household head								
Faculty	2.11	3.37	35.33	49.11	1.50	3.83	19.76	36.30
Other professional staff	2.65	2.70	53.61	45.31	2.70	2.90	31.13	25.94
Nonprofessional staff	3.46	3.98	72.67	63.99	3.82	3.62	42.79	31.25
Unknown	—	—	—	—	—	—	—	—
Education of household head								
High school graduate or less	4.40	2.65	86.72	37.86	5.24	2.57	51.61	12.86
Some college or college graduate	2.58	4.53	52.84	71.08	2.30	4.70	25.30	42.16
Some postgraduate work or graduate degree	2.76	2.76	56.32	43.93	2.96	3.02	38.58	28.87
Unknown	2.50	—	125.00	—	4.00	—	100.00	—
Covered by Stanford Major Medical Insurance								
Yes	3.03	3.20	67.23	50.00	3.21	3.44	39.94	31.46
No	3.08	2.56	51.76	46.31	2.99	2.62	29.06	22.82

TABLE 8. (Continued).

Member Characteristics	Number of Covered Services				Number of Covered Services Excluding "Free" Services			
	Per User		Per 100 Members		Per User		Per 100 Members	
	Kaiser	Clinic	Kaiser	Clinic	Kaiser	Clinic	Kaiser	Clinic
Covered by outside insurance other than Stanford Major Medical								
Yes	3.73	3.88	121.10	98.41	4.39	6.11	66.67	61.38
No	2.89	3.03	54.22	45.03	2.93	3.09	32.24	27.90
Satisfaction with the plan								
Completely satisfied	2.61	2.20	37.48	29.09	2.28	2.04	15.94	14.03
Generally satisfied	2.75	3.19	56.29	53.45	2.82	3.48	32.51	34.62
Not satisfied	4.61	6.57	144.62	144.07	4.96	6.88	108.97	99.15
Unknown	3.27	3.00	200.00	100.00	1.50	3.00	33.33	100.00
Health status								
Excellent	2.29	2.96	41.36	41.45	2.28	3.11	24.57	22.58
Good	3.48	3.05	79.41	49.47	3.86	3.48	49.51	35.04
Fair	5.37	4.17	144.62	137.74	5.47	3.69	63.08	90.57
Poor	7.33	5.40	200.00	192.86	16.00	8.00	145.45	171.43
Unknown	3.00	2.00	150.00	66.67	—	2.00	—	66.67
Had one or more hospitalizations in 12-month period								
Yes	3.17	3.12	87.69	125.61	3.00	3.78	60.00	106.10
No	3.04	3.15	61.07	46.72	3.16	3.33	35.42	27.86
Number of in-plan physician and paramedical visits for illness in 12-month period								
None	2.32	2.52	54.23	35.08	2.25	2.69	28.53	21.86
1–2	2.97	3.72	50.69	63.04	3.41	4.22	29.34	33.04
3–5	3.05	3.91	58.23	43.71	3.19	4.03	36.52	28.94
6 or more	4.51	2.45	100.85	56.70	4.23	2.77	62.32	44.13
Number of family members covered								
1	3.29	3.24	112.88	58.77	3.34	2.33	62.45	20.47
2	3.59	3.21	93.18	55.99	3.51	3.76	62.66	44.01
3–4	2.48	3.39	41.12	58.48	2.50	3.89	22.05	40.48
5 or more	2.86	2.00	28.29	19.03	3.41	1.60	17.83	7.08
Number of years in plan								
1	2.91	4.92	72.86	100.00	3.00	1.89	42.86	28.81
2–4	3.00	4.30	73.16	78.38	2.86	4.79	44.32	57.21
5–9	3.15	2.92	49.33	39.63	3.79	3.26	27.29	20.92
10 or more	—	2.58	—	40.42	—	2.81	—	25.21
Regular source of care								
Specific plan physician	3.65	2.41	55.75	34.42	3.63	2.61	32.53	20.97
Plan, no specific physician	2.29	5.18	43.48	93.36	2.43	4.79	26.64	54.50
Outside physician	4.62	10.18	328.85	752.17	4.83	8.27	278.85	647.83
No regular source of care	3.33	3.06	185.23	130.00	2.71	1.25	43.18	12.50

* Dependent children are not included.

striking: 2.3 per cent of all Kaiser and 1.5 per cent of all Clinic plan members had roughly 50 per cent of all out-of-plan covered services.

It is therefore not surprising that the data on the number of out-of-plan services *per out-of-plan user* by membership characteristics shown in the first two columns of Table 8 reveal few subgroups who were heavy users of out-of-plan services. The only user groups that stand out as relatively high users are Kaiser plan female subscribers, Kaiser and Clinic plan male spouses, dissatisfied members of both plans, Kaiser and Clinic plan members who rated their health status as poor, Kaiser plan members with six or more in-plan physician or paramedical visits for illness and recent Clinic plan joiners.

The multivariate analysis of the data on out-of-plan users (not reproduced here), where the dependent variable is the number of out-of-plan physician and paramedical services and the independent variables are the member characteristics of out-of-plan users, showed much the same relationships, although not all of them were statistically significant. Dissatisfaction with the plan was found to have a statistically significant relationship with a high use of out-of-plan services. Kaiser plan out-of-plan users who were not satisfied with the plan used 2.02 more outside services than users who were completely satisfied, with a corresponding figure for dissatisfied Clinic plan users of 4.55 more such services. The multivariate analysis also showed that Kaiser and Clinic plan male spouses and Kaiser plan female subscribers who were out-of-plan users used significantly more outside services than male subscribers who used outside services. The figures for spouses are 8.61 more out-of-plan visits for Kaiser and 18.61 more visits for Clinic plan spouses, and 2.19 more visits for Kaiser plan female subscribers.

While the multivariate analysis, like the cross tabulations in Table 8, showed that Kaiser and Clinic plan out-of-plan users who rated their health as fair or poor used more outside services than those who rated it as excellent or good, the differences are not statistically significant. However, the data show that in the case of Kaiser plan out-of-plan users the number of out-of-plan services increased slightly but significantly as the number of in-plan physician and paramedical visits for illness increased; for every additional in-plan visit, the number of out-of-plan services increased by 0.14. Finally, although the multivariate analysis, like the cross tabulations, showed that Clinic plan users who were recent joiners used more outside services than members of longer standing, the difference is not statistically significant.

To summarize, we found few characteristics of out-of-plan users associated with the volume of out-of-plan covered services. Moreover, the data show that a high probability of going outside the plan for covered services does not necessarily go with a high volume of out-of-plan services, and vice versa. For example, while having additional insurance coverage was associated with a higher probability of using some out-of-plan services, it was not associated with a higher volume of outside services. Finally, we found no statistically significant relationship between socioeconomic characteristics—family income, occupation and education—and the volume of out-of-plan services by users, just as we found no relationship between these variables and the probability of out-of-plan use.

We shall not discuss in detail the data on the number of out-of-plan services *per 100 plan members* by member characteristics shown in the third and fourth columns of Table 8. As in the case of the cross tabulations and multivariate analysis of the data on *users* of out-of-plan services, the cross tabulations and multivariate analysis of the data on *plan members* showed much the

same relationships between member characteristics and out-of-plan use. Thus, the multivariate analysis (not reproduced here), which duplicates for all members the analysis performed for users of out-of-plan services, showed that for members of both plans, only three characteristics had a statistically significant relationship with the number of out-of-plan services: satisfaction, health status as measured by self-assessment and having additional insurance. Holding other variables constant, dissatisfied Kaiser plan members had 1.09 and dissatisfied Clinic plan members 1.28 more out-of-plan services per year than members who were completely satisfied. Kaiser and Clinic plan members who rated their health status as fair or poor used 0.59 and 0.86 more out-of-plan services, respectively, than members who rated their health as excellent or good. Finally, Kaiser and Clinic members who had no additional insurance used 0.54 and 0.42 fewer out-of-plan services, respectively, than members who had such insurance. In addition, Clinic plan male spouses and Kaiser plan female subscribers were found to be significantly heavier users than male subscribers, with 1.31 and 0.70 more outside services, respectively; and Clinic plan members who had been covered by the plan less than five years also were heavier users than those who had been members longer, with 0.49 more outside services.

Covered Services: Reasons for Out-of-Plan Use

In the telephone interviews all respondents who reported an out-of-plan episode of care for covered services either for themselves or a dependent were asked the reason for having gone to a nonplan provider. The responses are summarized in Table 9, which shows the distribution of outside episodes of care by reason for out-of-plan use. By far the most frequently given reason was preference for a nonplan provider, which was cited as the reason for 50.7 per cent of the Kaiser and 43.5 per cent of the Clinic plan episodes. Needing emergency care was cited as the reason for 13.8 per cent of both the Kaiser and Clinic plan episodes of out-of-plan care. Being too far from plan providers was a reason more often given for Clinic than Kaiser plan outside use, explaining 26.9 per cent and 13.2 per cent of outside episodes, respectively. By contrast, having to wait too long for an

TABLE 9. Per Cent Distribution of Out-of-Plan Episodes of Covered Physician and/or Paramedical Care (July 1973 to June 1974)

Reason for Out-of-Plan Use	Covered Services		Covered Excluding "Free" Services	
	Kaiser	Clinic	Kaiser	Clinic
	100.0% (N = 560)	100.0% (N = 457)	100.0% (N = 303)	100.0% (N = 244)
Needed emergency care	13.8	13.8	10.6	14.3
Too far away	13.2	26.9	16.2	22.5
Too long to get appointment	12.1	6.1	17.2	4.9
Preferred nonplan physician	50.7	43.5	50.2	52.5
Other	10.2	9.6	5.9	5.7

appointment was cited more frequently for Kaiser than Clinic plan episodes, with figures of 12.1 per cent and 6.1 per cent, respectively. Finally, a variety of reasons were given for the remaining 10.2 per cent of Kaiser and 9.6 per cent of Clinic plan episodes of out-of-plan care. Most of the responses in this category indicated confusion on the part of plan members about the coverage status of the service, many of them stating that they believed it was not covered by their plan. We do not know whether plan members who used out-of-plan services because they needed emergency care or were too far away from plan providers were refused reimbursement by the plans (since the plans will pay for such services when they are considered justified) or whether they did not trouble to claim reimbursement.

Out-of-plan users were also asked the condition for which they sought out-of-plan care. About 27 per cent of the Kaiser and 20 per cent of the Clinic plan out-of-plan episodes were for preventive services such as immunizations, check-ups, well-baby care and blood pressure checks. The vast majority of the rest were for minor medical and surgical problems. The most frequently mentioned of these were sore throat, flu, colds, rash, allergy problems, low back pain, and minor injuries and accidents. A very few episodes of out-of-plan care were for consultations about a serious health problem such as cancer.

We also wanted to test the frequently mentioned hypothesis that women members of prepaid plans may have previous ties with a nonplan obstetrician, or mothers with a nonplan pediatrician, whom they continue to consult after joining the prepaid plan. Unfortunately, our data on the fields of specialty of outside providers of covered services are unsatisfactory. Somewhat surprisingly, 60 per cent of Kaiser and 66 per cent of Clinic plan respondents were unable to name the provider's field of specialty. If we assume that they knew if the provider was an obstetrician or pediatrician (and this assumption is probably valid), we can use the data on known specialties for an examination of the validity of the above hypothesis. These data do not support it. Only about one third of outside episodes of covered care of both Kaiser and Clinic plan members involved obstetricians/gynecologists and pediatricians. The rest involved general practitioners, internists, other medical specialists and surgical specialists other than obstetricians/gynecologists.

Noncovered Services

In addition to the use of out-of-plan covered services, we also examined the use of noncovered medical services. Our findings are summarized in Table 10, which shows that 6.7 per cent of Kaiser and 19.7 per cent of Clinic plan members had at least one noncovered service. The relatively high percentage of Clinic plan members who used noncovered services is explained by the fact that routine eye refractions are not covered by the Clinic plan and are therefore counted as noncovered services. When Clinic plan members whose only noncovered service was such an eye examination are excluded, the proportion who used noncovered services becomes much the same as that of Kaiser plan members, 6.0 per cent. The average number of out-of-plan services per user was 15.15 for Kaiser and 5.85 for Clinic plan members; the latter figure becomes 16.22 when eye refractions are excluded.§§ In terms of noncovered services per member, the figures are 1.02 for Kaiser and 1.15 for Clinic plan members (or 0.98 for the latter when eye examinations are excluded).

§§ These figures reflect the fact that relatively many Clinic plan members had eye examinations, but few if any had more than one such service during the 12-month period; by contrast, relatively few members of either plan had other noncovered services, but those who did had relatively large numbers of such services.

TABLE 10. Out-of-Plan Use of Noncovered Physician and/or Paramedical Services (July 1973 to June 1974)

	Kaiser	Clinic	
% with at least one noncovered service	6.7	19.7	(6.0)*
% with at least one noncovered psychiatric service	2.8	4.5	
% with at least one noncovered eye examination	—	14.8	
Mean no. of noncovered services per user	15.15	5.85	(16.22)†
Mean no. of noncovered services per member	1.02	1.15	(.98)†
Mean no. of noncovered psychiatric services per member	.64	.78	
Mean no. of noncovered services rendered by paramedical personnel per member	.48	.32	(.30)†

* Excluding those with routine eye examinations only.

† Excluding routine eye examinations.

The principal noncovered service reported by members of both plans was psychiatric care. Almost 3 per cent of Kaiser and 4.5 per cent of Clinic plan members had at least one psychiatric service during the 1-year period of the study. The average number of psychiatric services per plan member was 0.64 for Kaiser and 0.78 for Clinic plan members, thus representing about two thirds of all noncovered services of members of both plans. For Clinic plan members, routine eye refractions were another fairly frequently used service, accounting for about 15 per cent of noncovered services. It is of interest to note that Kaiser plan members relied for almost half of their noncovered services on nonphysician personnel, while Clinic plan members tended to consult physicians and obtained only just over one quarter of their noncovered services from such personnel. The most frequently consulted nonphysicians were chiropractors, psychologists and—in the case of Clinic plan members—optometrists.

Out-of-Pocket Expenses for Covered and Noncovered Services

Out-of-pocket expenditures for medical services obtained outside the plan are shown in Table 11.[10] Both the distributions of such expenditures and average expenditures per user of out-of-plan services and per plan member are given separately for covered services, noncovered services and both types combined. Total out-of-pocket expenses for out-of-plan covered and/or noncovered services averaged $89.83 for Kaiser and $114.64 for Clinic plan users of such services, or $22.66 per Kaiser and $36.39 per Clinic plan member. As the various figures show, members of both plans spent substantially less for covered than for noncovered services, expenditures for covered services representing 28 per cent of the total out-of-pocket expenditures of Kaiser plan members and 25 per cent of those of Clinic plan members.

[10] The figures in Table 11 understate out-of-pocket expenses to an unknown degree because they contain a small number of members of both plans who said they had had some out-of-pocket expenses for covered and/or noncovered services but did not remember the amount. If we assume that such persons had the same average out-of-pocket expenses as users of out-of-plan services who reported having had some expenses and remembered how much these had been, we get the following estimates of out-of-pocket expenses per plan member:

	Covered services	*Noncovered services*	*All out-of-plan services*
Kaiser	$6.75	$16.84	$23.59
Clinic	9.59	29.51	39.10

These estimates may actually be on the high side since they are based on expenses by out-of-plan users with expenses, some of whom had high expenses; however, it is reasonable to assume that those who reported to have made a payment but did not remember the amount very probably had only minor expenses.

TABLE 11. Distribution of Kaiser and Clinic Plan Out-of Plan Users by Amount of Out-of-Pocket Expenses (July 1973 to June 1974)

Range of Out-of-Pocket Expenses	Covered Services		Noncovered Services		All Out-of-Plan Services	
	Kaiser	Clinic	Kaiser	Clinic	Kaiser	Clinic
	100.0% (N = 419)	100.0% (N = 338)	100.0% (N = 138)	100.0% (N = 422)	100.0% (N = 520)	100.0% (N = 679)
$0	47.5	45.0	5.8	9.0	37.3	22.7
$1–49	35.8	38.8	35.5	65.8	35.0	53.3
$50–99	11.0	5.3	6.5	3.8	9.6	5.4
$100–499	4.9	8.9	39.8	14.5	14.2	13.0
$500 +	.7	2.1	12.3	6.9	3.8	5.6
Mean expense						
per user	$31.11	$57.69	$244.05	$138.25	$89.83	$114.64
per member	6.32	9.12	16.34	27.27	22.66	36.39

The distributions of out-of-plan users by amount of out-of-pocket expenses show that a relatively small percentage of all users had high expenses. Only 3.8 per cent of Kaiser and 5.6 per cent of Clinic plan users of out-of-plan covered and noncovered services had out-of-pocket expenses of $500 or more, and only 18.0 per cent of Kaiser and 18.6 per cent of Clinic plan users had expenses of $100 or more. Put differently, this means that 18.0 per cent of Kaiser plan out-of-plan users, or 4.6 per cent of all Kaiser plan members, were responsible for 82.8 per cent of total out-of-pocket expenditures for covered and noncovered services. Similarly, 18.6 per cent of Clinic plan out-of-plan users, or 5.9 per cent of all Clinic plan members, accounted for 84.8 per cent of total out-of-pocket expenses.

The distributions of out-of-plan users of covered services by amount of out-of-pocket expenditures show the same picture. Only 5.7 per cent of Kaiser and 11.0 per cent of Clinic plan users of such services spent $100 or more for them, and only 16.7 per cent and 16.3 per cent, respectively, spent $50 or more. In terms of the percentage of total expenditures for out-of-plan covered services, this means that 3.4 per cent of Kaiser plan members accounted for just over 70 per cent of out-of-pocket expenses, and 2.6 per cent of Clinic plan members for a little over 80 per cent. The distributions of out-of-plan users of noncovered services are somewhat less skewed. Nevertheless, again a very small percentage of all plan members accounted for a high percentage of total out-of-pocket expenses for these services, 3.5 per cent of Kaiser plan members accounting for 94 per cent, and 4.2 per cent of Clinic plan members for 86 per cent of such expenses. Like the data on the number of out-of-plan noncovered services by type of service, the expenditure data show that psychiatric care was the principal service obtained, accounting for 72 per cent of Kaiser and 76 per cent of Clinic plan members' expenditures for noncovered services.

We have made an estimate of out-of-pocket expenses for out-of-plan services as a percentage of the total costs of the two plans, i.e., expenditures for premiums (both the share paid by plan members and that contributed by Stanford University), plus the Kaiser copayment of $1 for office visits and the Clinic 25 per cent co-

insurance payment, plus out-of-pocket expenses for out-of-plan care.** In the case of Kaiser plan members, expenditures for all out-of-plan services represented 12.3 per cent of total costs and expenditures for covered services alone 3.4 per cent. The corresponding figures for Clinic plan members are 13.3 per cent and 3.3 per cent of total costs, respectively. Clearly, expenditures for services that members of both plans could have obtained from plan providers are a minor fraction of total costs.

Comparison With Other Studies

Extent of Out-of-Plan Use of Covered Services

In view of the lack of comparability of data on out-of-plan use discussed earlier, it is difficult to assess how the extent of out-of-plan use of services, especially of covered services, that we found in our study compares with that reported for members of other prepaid plans. The only study with data comparable to ours, in the sense that a distinction is made between covered and noncovered services and attention is focused on covered services, is that by Pope et al.[18] for the Kaiser-Oregon plan in 1971. They found that between 6 per cent and 7 per cent of a sample of 2,500 adults who had been members of the Kaiser plan for at least two years had used nonplan physicians for covered services; the lower figure refers to members who had to pay for such services, the higher includes members who also received "free" services. In addition, the authors found that the mean number of conditions for which outside services were used was only slightly above one, and that most episodes of out-of-plan care involved only one visit. Even if we make the rather liberal assumption, based on this information, that out-of-plan users averaged 1.5 outside covered physician services per year, this translates into only 10–11 such services per 100 members per year, very much less than the volume reported by the Kaiser and Clinic plan members in our study.

Data from three other studies conducted in the late 1960s and early 1970s, although not strictly comparable to our data because they refer to *all* out-of-plan physician services, covered and noncovered, also suggest that out-of-plan use of covered services of our two groups is relatively high. Richardson et al.,[19] in their 1971–1974 study of a near-poverty population enrolled in a large prepaid group practice plan in Seattle (Group Health Cooperative of Puget Sound), found that 16–19 per cent of enrollees had at least one visit to an outside physician and that 11 per cent of all their physician visits, in-plan and out-of-plan, were to an outside source. Hetherington et al.,[16] reporting on out-of-plan use by members of one large and one small prepaid group practice plan in the late 1960s, found that 10.5 per cent of all physician visits by members of the large group and 6.9 per cent of those by members of the small group were to out-of-plan physicians. In a study of three HMOs in Rochester, New York, Ashcraft et al.[3] report that out-of-plan use of ambulatory services was minimal, with only 3 per cent of all ambulatory services provided outside the plans. A fourth study, of out-of-plan use by members of Kaiser-Northern California in 1971,[22] reported that 35 per cent of the membership had used non-Kaiser doctors at some time in the preceding two years, which makes the data difficult to compare with ours. In addition, 22 per cent of these out-of-plan users were later reimbursed by Kaiser be-

** The figures below show mean costs of the two plans per plan member by type of cost, and mean out-of-pocket expenditures (i.e., costs excluding the share of the premium paid by Stanford University):

	Kaiser	*Clinic*
Mean costs per member	*$184.29*	*$273.53*
Premium	158.61	206.16
Copayment	3.01	30.98
Out-of-plan expenses	22.66	36.39
Mean out-of-pocket expenses per member	$ 95.65	*$191.44*

cause their out-of-plan services were emergency visits while out of the Kaiser service area.

Three studies dealing with Medicaid[12,15] and Medicare[13] enrollees in prepaid practice plans and carried out in the early 1970s found out-of-plan use of all types ranging from practically zero[12] to almost two thirds of all physician services obtained by the enrollees.[15] Because of the special characteristics of these groups, however, these data are not comparable to ours.

It is of interest to note that the few early studies of the utilization experience of prepaid plans conducted in the 1950s show relatively high rates of out-of-plan use. A study of Kaiser-Northern California members,[7] referring to all out-of-plan use in 1958, found that one third of the families in the sample reported one or more visits to physicians outside the plan. It was also found that plan members received 72 per cent of their office and home visits from plan providers, 12 per cent from outside physicians at their own expense and 15 per cent from outside providers at no charge. Another study, reporting on the experience of a St. Louis prepaid group practice plan in the early 1950s and also referring to all out-of-plan services,[21] found that almost half the families in the sample had used some outside physician services during the year of the study and that plan members had received 23 per cent of their total professional services from out-of-plan providers. A partial explanation of the high percentage of out-of-plan users is the fact that the figure refers to families, not individuals, which means that a multimember family is counted as an out-of-plan user even if only one member used out-of-plan services. An explanation of the high proportion of services obtained from out-of-plan providers (making a reasonable allowance for noncovered services) may be that the plans were fairly new so that many plan members still had ties to a previous family physician. Another possible reason is that the plans were not only new but a novel form of health care delivery that took some getting used to. There is also some evidence that a large share of the out-of-plan physician visits were emergency or home visits when plan members found it more convenient to consult a neighborhood physician rather than go to the plan physician or facility.

In summary, there is some evidence that Kaiser and Clinic plan members may have been somewhat heavier users of out-of-plan covered services than members of other prepaid plans in the 1970s, though the evidence is not conclusive because most other studies deal with all out-of-plan services rather than only covered services. One possible explanation may be the very high availability of other sources of care in the Palo Alto–Stanford area and the relative medical sophistication of our groups that this wealth in medical resources is likely to entail. It is also possible, however, that other studies have underestimated out-of-plan use. The Kaiser-Oregon study and, so far as we can judge, most other studies as well, used a 1-year recall period for information on out-of-plan use, while we contacted plan members every three months. In addition, our initial household interview included questions on other insurance coverage such as student health policies and eligibility for Veterans Administration benefits and CHAMPUS, and our interviewers probed for use of such services when contacting plan members who had reported such coverage. Despite these frequent and probing contacts, we found that a few enrollees who had used out-of-plan services could not remember what they had paid for them. It is quite likely, therefore, that a 1-year recall period is too long for remembering such a relatively rare and usually inexpensive event as use of an out-of-plan service and thus leads to an underestimate of out-of-plan use.

Characteristics of Out-of-Plan Users of Covered Services

Most of the studies of out-of-plan use make at least some attempt to examine member characteristics associated with going outside the plan, usually in terms of the percentage of plan members with some out-of-plan services, but occasionally in terms of the percentage of medical services obtained outside the plan. Some of their findings agree with ours, others disagree. Not surprisingly, dissatisfaction with the plan is generally found to be an important factor. The studies by Pope et al.,[18] Freidson,[11] Fuller et al.,[12] Anderson and Eggers,[4] and Franklin and McLemore[10] all found that dissatisfied plan members were more likely to use out-of-plan services and/or to obtain a substantial percentage of their care outside the plan than satisfied members. The study by Pope et al. of Kaiser-Oregon plan members provides the most careful analysis of specific reasons for dissatisfaction. The most important of these are complaints about the quality of care, difficulty of access to physicians and impersonality of care.

The evidence on the relationship between health status and out-of-plan use is mixed. Pope et al.[18] found no relationship in their study of Kaiser-Oregon plan members. By contrast, Smillie[22] reported that Kaiser-Northern California plan members who were heavy users of in-plan services (presumably because they were ill, though he does not say so) were the ones who were the most likely to use outside services. Similarly, Anderson and Eggers[4] found that students who experienced disability were more likely to see physicians outside their prepaid plan than healthier enrollees. The study by Greenfield et al.[13] of Medicare members enrolled in HIP found an association between frequency of out-of-plan use and severity of illness as measured by frequency of hospitalization, average amount of reimbursed charges for hospitalization, average number of days in hospital for persons with at least one hospital episode, frequency of surgical hospitalization and mortality. The values for all of these measures were found to be greater for out-of-plan users than for those who used only HIP services. On balance, despite the negative findings of the Kaiser-Oregon study, it can probably be concluded from the other evidence that plan members in poor health are more likely to go outside the plan than members in good health, but that the evidence that they will also use more outside services is slim.

Some of the studies examine the role of length of plan membership, but the results to date are unsatisfactory. Freidson,[11] Anderson and Eggers,[4] and Franklin and McLemore[10] all found that the probability of out-of-plan use increases with length of time in the plan. However, what they measure is out-of-plan use *at any time* during the enrollee's plan membership. This makes their findings merely what common sense suggests, i.e., that the longer a person is enrolled in a plan, the more likely it becomes that he/she will go outside it *at some time* over the course of the years. Simon and Rubushka,[21] in their 1956 study, found some indirect evidence that the probability of a plan member being an out-of-plan user in a given period of time declines with length of plan membership because "As the members begin to use the plan they find less need to seek services elsewhere." Nevertheless, our finding of a small but significant inverse relationship between out-of-plan use and length of plan membership must be regarded as tentative until confirmed by other studies, especially since our evidence comes primarily from just one of the plans, the Clinic plan.

Several studies look at the roles of age, sex and marital status. Except for the finding that children are the least likely to go outside the plan, on which the two studies that examine this factor[6,18] agree with each other and with our findings, there is no

general agreement about the relationship between these characteristics and out-of-plan use. The groups for which one study or another found a high probability of outside use include women compared with men,[18] married women compared with single men and women and married men,[6] and married students—male and female—compared with single students.[4] Since our study also found no consistent relationship between these variables and out-of-plan use for members of the two plans, it is possible that there is no generalizable relationship and that factors other than age, sex and marital status are more important. At least one study, however, confirms our finding that family size is inversely related to the likelihood of out-of-plan use. Pope et al.[18] found that Kaiser-Oregon plan members who were outside users ". . . are more likely than others to be in one or two person families (59% compared to 50%). Or, to put it another way, outside users are more likely (57%) than others (49%) to be in Health Plan units with no children." Despite this confirmation of our findings, further studies are needed before definite conclusions about the relationship between family size and outside use can be made.

While we found no association between outside use and socioeconomic status as measured by family income, occupation and education of the head of the household, two studies[11,18] found that the higher socioeconomic groups were more likely than others to go outside the plan. For example, the Kaiser-Oregon study[18] shows that "About 37% of the outside users compared to 30% of all others were in the highest educational category; 28% vs. 22% had an income of $15,000 or more; 43% vs. 35% were in white-collar occupations." Thus, this is another area where further investigation is needed before definite conclusions can be drawn.

None of the studies we examined or know of mentions the availability of additional insurance coverage and its possible association with out-of-plan use. This is rather surprising, at least in the case of the more recent studies carried out at a time when duplicate coverage was no longer a rare exception. Since we found that such additional insurance coverage was associated with a significantly higher probability of out-of-plan use, and since the increase in the number of married women working outside the home is very probably leading to an increase in the percentage of the population with duplicate insurance coverage, this is a factor that needs careful scrutiny.

Conclusion

In conclusion, a few observations on our findings deserve special emphasis. First, our study found that while a fairly high percentage of members of both plans used some out-of-plan covered services, the vast majority of these out-of-plan users were occasional users, and only a very small number were really heavy users, accounting for most of the out-of-plan services of the two groups. Since at least two other studies[11,18] cite evidence that confirms this finding, it may well be true of prepaid plans in general, although future studies should pay more attention than have most studies in the past to the distribution of out-of-plan users by amount of out-of-plan services or expenditures. If future studies also confirm our finding, it becomes rather misleading to measure out-of-plan use solely in terms of the percentage of the membership with some out-of-plan use or to express out-of-plan use in terms of the average number of out-of-plan services or the average amount of expenditures for out-of-plan services per plan member. Occasional out-of-plan use is probably a fact of life that will occur in all prepaid plans and is of relatively minor importance. It is the high out-of-plan users who deserve special attention.

Second, while our study was able to determine some of the member characteristics associated with high out-of-plan use of covered services, it could not answer the important question of whether the high out-of-plan users are a hard core of members who year after year obtain a substantial portion of their medical care from nonplan providers, or whether high users in one year drop out of the plan after a while and are replaced by other high out-of-plan users. This piece of information is essential for a better understanding of out-of-plan use and should be explored in future studies.

Third, our study and several other studies of the subject showed that dissatisfaction is a principal (if not *the* principal) characteristic associated with high out-of-plan use. Few studies, including ours, have examined what exactly is at the root of such dissatisfaction. Thus, this is another question that deserves more attention in future studies. Furthermore, if it should be found that dissatisfied members who use nonplan providers for a large part of their medical needs remain members of the plans year after year, the question arises as to why they stay with the plan.

Finally, and perhaps most important, there is the question of duplicate insurance coverage. As pointed out above, such duplicate coverage is becoming increasingly common and is likely to continue to grow in the future. This trend needs careful study, not only because it is likely to affect out-of-plan use under prepaid and other health insurance plans, but—and this is more important—because it complicates the evaluation of medical and hospital utilization rates under such plans. A person covered by two plans may, for example, obtain half of his/her medical care from one plan and the other half from the other. This lowers utilization rates under both plans, which in turn may lead to undeserved criticism of both plans for not providing sufficient ambulatory care and/or to undeserved praise for reducing the use of hospital care. Luft,[23] for example, has shown that about half of the decline in the Blue Cross hospital admission rate nationally during the period from 1968 to 1978 is attributable to increasing duplicate coverage. Clearly, this is an area in need of further study.

References

1. Scitovsky AA, McCall N, Benham L. Factors affecting the choice between two prepaid plans. Med Care 1978;16:660.

2. Scitovsky AA, Benham L, McCall N. Use of physician services under two prepaid plans. Med Care 1979;17:441.

3. Scitovsky AA, McCall N. Use of hospital services under two prepaid plans. Med Care 1980;18:30.

4. Anderson JG, Eggers PW. Patterns of utilization among members of a prepaid group practice. Inquiry 1976;XIII:382.

5. Ashcraft M, Penchansky R, Berki SE, Fortus RS, Gray J. Expectations and experience of HMO enrollees after one year: an analysis of satisfaction, utilization, and costs. Med Care 1978;16:14.

6. Bashshur RL, Metzner CA, Worden C. Consumer satisfaction with group practice, the CHA case. Am J Pub Health 1967;57:1991.

7. Columbia University School of Public Health and Administrative Medicine. Family medical care under three types of health insurance. New York: Foundation of Employee Health, Medical Care and Welfare, Inc., 1962.

8. Corbin M, Krute A. Some aspects of Medicare experience with group-practice prepayment plans. Soc Secur Bull 1975;38:3.

9. Donabedian A. An evaluation of prepaid group practice. Inquiry 1969;VI(3):3.

10. Franklin BJ, McLemore SD. Factors affecting the choice of medical care among university students. J Health Soc Behav 1970;11:311.

11. Freidson E. The organization of medical practice and patient behavior. Am J Public Health 1961;51:43.

12. Fuller NA, Patera M. Report of a study of Medicaid utilization of services in a prepaid group practice health plan. DHEW, Public Health Service, Bureau of Medical Services, January 1976.

13. Greenfield CA, Densen PM, Jones EW, Kleinman JC, Miller JA. Use of out-of-plan services by Medicare members of HIP. Health Serv Res 1978; 13:243.

14. Harris L, et al. American attitudes toward health maintenance organizations. New York: July

1980. (Prepared for The Henry J. Kaiser Family Foundation.)

15. Hester J, Sussman E. Medicaid prepayment: concept and implementation. Milbank Mem Fund Q 1974;52:415.

16. Hetherington RW, Hopkins DE, Roemer MI. Health insurance plans: promise and performance. New York: Wiley-Interscience, 1975.

17. Luft HS. Health maintenance organizations: dimensions of performance. New York: Wiley-Interscience, 1981.

18. Pope CR, Freeborn DK, Greenlick MR. Use of outside physicians by members of a group practice prepayment plan. Presented at A.P.H.A. Annual Meeting, November 1972.

19. Richardson WC, Boscha MV, Weaver BL, Drucker WL, Diehr PK. The Seattle prepaid health care project: comparison of health services delivery. University of Washington: Dept. of Health Services, School of Public Health and Community Medicine, November 1976.

20. Roemer MI, Hetherington RW, Hopkins CE, Gerst AE, Parsons E, Long DM. Health insurance effects: services, expenditures, and attitudes under three types of plans. Bureau of Public Health Economics, Research Series No. 16, School of Public Health, University of Michigan, 1972.

21. Simon N, Rubushka S. Membership attitudes in the Labor Health Institute of St. Louis. Am J Public Health 1956;46:716.

22. Smillie JG. Testimony before the United States House of Representatives, Subcommittee on Public Health and Environment of the Committee on Interstate and Foreign Commerce, Health Maintenance Organizations. Hearings, April 11-13, 1972. Serial 92-88.

23. Luft HS. Diverging trends in hospital utilization: fact or artifact? Forthcoming in Med Care.

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Membership Duration and Utilization Rates in a Prepaid Group Practice

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The relationship between utilization rates and duration of membership in prepaid group practices can have important implications for national policy and HMO administration. The results of this study demonstrate a substantial reduction in utilization rates with increasing duration of membership over a 5-year period in a developing prepaid group practice (PGP) located in urban St. Louis. This "start-up effect" is strongly evident across different socioeconomic subgroupings of the study population (sex, race, income, education and age) and for different employers and cohorts. The implications of widespread start-ups for health care financing policy and for important PGP management decisions are discussed, and suggestions are made for future study of the start-up phenomenon.

AN IMPORTANT AND TIMELY TOPIC is that of the effect of duration of enrollment on rates of utilization of health care services in prepaid group practices. Results of investigations to date are mixed. Some authors have reported the existence of a definite "start-up effect" that is marked by a substantial reduction in the utilization rates of new enrollees as their length of membership in PGPs increases; this phenomenon appears to be the result of initially high rates of utilization by new members as they explore the plan, test the benefits offered, and are screened and treated for preexisting illnesses, followed by lower utilization rates as members become acquainted with the plan and their illnesses are treated.[1,2] On the other hand, a more recent study concluded that no such start-up effect exists.[3]

It is important to resolve this issue because the existence, generality and magnitude of such start-ups can have important implications for national policy and for the effective administration of PGPs. It could be proposed, for example, that the federal government encourage HMO development generally by providing extra reimbursement for the start-up costs associated with enrolling new members.

The government might also provide special incentives for enrolling groups of poor or medically disadvantaged individuals in PGPs. Administrators could fear that such individuals would have a high degree of unmet health needs that would result in high initial rates of utilization and a drama-

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tic start-up effect. The cost of these start-ups could therefore be an appreciable deterrent to the enrollment of such groups unless special financing mechanisms were developed.

Substantial start-ups also have many important consequences for PGP management because large changes in utilization affect the "service capacity" of a program, which, in turn, alters the essential bases for most planning and control functions within the organization. For example, a plan's marketing strategy should be determined in relation to the start-up effect; and administrators should also reflect this effect in their staffing and equipment acquisition decisions, premium calculations and facility expansion plans.

Past Studies

Past studies provide only equivocal support for the existence of a general start-up phenomenon. Among older studies, four showed some decline in the rate of utilization with increases in membership duration.[4-7] The strength and implications of these results are diminished somewhat, however; since these studies typically relied on cross-sectional—rather than longitudinal—analyses, intervening variables were often not controlled, and other methodological difficulties were encountered.

Two articles recently published in this journal speak most directly to the existence of the start-up phenomenon. In the first of these, Yesalis and Bonnet reported the existence of a substantial start-up effect based upon their longitudinal analysis of new enrollees in a PGP located in Columbia, Maryland.[2] They found that three indices of utilization—the total number of visits to providers, the proportion of well-care visits and the rate of new prescriptions filled—decreased by as much as 50–60 per cent over a time period of roughly two years. The authors described their study population as being homogeneously young, educated and upper-middle class. They did not, therefore, examine the impact of age, sex or socioeconomic variations on the start-up effect.

These findings are questioned in the most recent longitudinal study of the start-up effect. Based upon their analyses of utilization data drawn from the Kaiser-Permanente Health Care Plan in Portland, Mullooly and Freeborn concluded that "in general, . . . the length of time on the plan does not appear to be a major factor in accounting for changes in ambulatory care utilization or in the amount of services used."[3]‡ Furthermore, they critically reviewed Yesalis and Bonnet's findings and suggested that the start-up effect in this study was a statistical artifact of the methodology employed: "the start-up utilization effects reported by Yesalis and Bonnet became apparent only after statistical techniques adjusting for seasonality, changes in the ratio of provider manpower, health plan hours and benefit packages were made."[3]

The results of Mullooly and Freeborn's study bear closer examination. They relate to two different groups drawn from the Kaiser-Permanente Plan for the period of 1968 through 1972. The first study group included a sample of persons normally enrolled in the Kaiser Health Plan, but the second study group was an experimental population drawn from participants in an OEO Neighborhood Health Center Project. Utilization of ambulatory care services by these two study populations was analyzed for a period of approximately 5 years (21 quarters). The two study populations were divided into subgroups by age and sex categories, but no specific analysis by income, education level or race was performed.

‡ Another paper that used essentially the same data base and methodology as Mullooly and Freeborn also reported finding no evidence to support the start-up phenomenon.[8]

Mullooly and Freeborn's general conclusion about the absence of a start-up effect was based importantly upon their graphic analyses of utilization rates over time for the two different study populations taken in the aggregate and the separate graphic plots for several different sex–age subgroups of the two populations. Our interpretation of these graphic results is somewhat different from theirs. Although the two aggregate plots show no start-up and are therefore consistent with their conclusion, the plots for several sex–age subgroups seem to show definite and pronounced start-ups. Specifically, the plots for males and females aged 0 through 14 years in both study populations show a rather clear *downward trend* in utilization; in all four of these cases, there were sizable reductions in utilization rates for approximately three years.§ Older members of the two study populations appear to have had quite different utilization histories. The utilization plots for both males and females aged 45 through 59 years in both populations show sizable *upward* trends in utilization occurring during the 21 quarters of the study.‖

These detailed results for the subgroups raise questions about the meaning of the aggregate plots. Because of the opposite and potentially canceling utilization trends of the subgroups shown in the study, the aggregate utilization histories and the conclusions drawn from them may have limited generality and application.# For example, generalizations or extensions of the conclusions to other plans may be restricted by the specific sizes and mix of the sex–age subgroups of these plans. The applicability of these results may also be limited for both managerial and policy purposes. Managers need to know the utilization behavior of specific socioeconomic subgroups in order to plan and operate effectively; average results for an entire population, for example, may not indicate the different and nonsubstitutable services that will be demanded by different subgroups (such as pediatrics versus geriatrics). In policy considerations as well, attention is often focused on specific socioeconomic groups, rather than on the total population.

In summary, the past literature on the subject of the start-up effect seems to be incomplete in several ways: It provides little consistent evidence for the existence of a start-up effect; the effect of different socioeconomic status (SES) classifications upon utilization behavior has not been studied sufficiently; too little attention has been paid to important policy and management implications of start-ups.

These three issues are examined below: we present evidence of a strong start-up effect in a plan that resembles many young PGPs that have developed in the past decade. Our analyses explicitly recognize variations in the characteristics of the start-up effect for different SES groups based upon sex, race, income, education and age—and for different employers and cohorts. We conclude by discussing important policy and managerial implications of the results.

§ Starting in the second quarter of membership and continuing through the 12th quarter, the number of provider visits per quarter were decreased by approximately 30–40 per cent in three of the four plots, and by approximately 25 per cent in the fourth.

‖ The two female subgroups show an upward trend throughout the 5-year history, yielding overall increases in utilization of approximately 20 per cent and 30 per cent in the two cases. For males aged 45 through 59 years, this upward trend develops later, but the increases in utilization from the 12th to the 21st quarter are approximately 20 per cent and 40 per cent.

The utilization plots for the other sex–age groups are not given, so we cannot evaluate their effect on the aggregate. Based upon the evidence shown, it seems quite possible that the aggregate graphs are artifacts of cumulating different utilization trends for the subgroups, resulting in an aggregate curve that does not describe its components well.[9]

Study Setting

The setting of this study is the Medical Care Group (MCG), a closed-panel prepaid group practice located in St. Louis, Missouri. The plan began in 1969 and has grown to a current enrollment of 24,000. Plan members normally enroll through their employers, who contract with MCG for services. The large number of employers (160), of different size and nature (business, government, education, etc.), has resulted in a diverse membership.

Primary care services are delivered at MCG's ambulatory care facility, which is located in an urban area next to a large number of acute care facilities and major teaching centers.[10] All patients are assigned a primary care physician with whom they normally interact. Fourteen physicians, three physician's assistants, 16 nurses and four nurse practitioners are currently employed. MCG contracts with the Washington University School of Medicine for consultations with specialists, surgical procedures, laboratory tests, X-rays and other specialized procedures and services.

MCG has always offered a comprehensive package of ambulatory, hospital and home services to its enrollees without deductibles.

Data and Analysis

The utilization data upon which this study is based were drawn from the outpatient encounter file at MCG for the 5-year period from 1973 to 1977. This file includes all outpatient encounters and provides information relating to the purpose of the encounter, diagnosis, procedures performed and attending provider.

The socioeconomic data used in the study were collected through a mail survey of enrollees that was conducted by MCG in 1978. Only respondents to this survey (63 per cent of the total MCG population) who enrolled after January 1, 1973 and continued membership through 1977 are included in the study population.¶

The utilization measure used for analysis is "provider visits," which includes all encounters with either a physician or a physician's assistant that took place at the ambulatory care facility. Encounters with other personnel (nurse, social worker, etc.) and in other settings (emergency room, patient's home, etc.) are excluded. The number of provider visits made in each quarter since a member's enrollment are averaged over all enrollees for each quarter and converted to an annual rate. The "provider visit" measure was defined in this way to make it comparable to those used in the studies by Yesalis and Bonnet and Mullooly and Freeborn.**

Duration of membership was measured in relation to "calendar quarters" of enrollment in the plan. That is, the aggregated number of provider visits was compared with the number of calendar quarters since a person's enrollment.††

¶ The sex, family size and employment characteristics of the nonrespondents are similar to those of the study population.[11] Analysis without socioeconomic subcategorization of these nonrespondents showed utilization patterns similar to those of the study population on all important characteristics, but the overall level of utilization was slightly lower. Persons who disenrolled from MCG (two to five per cent per year) are also excluded from the analyses.

** It is not identical, however, because of differences between the plans in the way providers are used. For example, we have excluded nurses—whom Mullooly and Freeborn included—because they have a more managerial or mediating role at MCG.

†† The calendar quarter definition of duration is consistent with the precedent set by Yesalis and Bonnet. It differs from that used by Mullooly and Freeborn, who defined the first quarter of membership to be the first 90 days of membership, regardless of the calendar date of enrollment. The calendar quarter approach is more useful for two reasons: 1) it relates to the normal data aggregation base of PGPs and is therefore more likely to be chosen in future research, while the other definition would require costly reorganization of data files, and 2) calendar quarters are also the normal basis for most of the administrative functions affected by start-ups. The calendar quarter definition has the drawback, however, of including in the same quarter individuals of differing exact durations of membership. The implica-

TABLE 1. Annualized Number of Provider Visits by Quarter of Enrollment

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Study Population(1)	3.48 (10730)	5.37 (9851)	4.88 (8472)	4.36 (7555)	4.55 (5939)	4.55 (5200)	4.47 (4524)	3.89 (4361)	3.85 (2271)	4.13 (1847)	4.01 (1632)	3.91 (1548)	3.61 (1144)	3.82 (806)	3.71 (606)	3.54 (570)	3.65 (301)	4.10 (278)	3.23 (259)	3.14 (98)
Sex:																				
Female(2)	3.76 (5613)	5.86 (5154)	5.52 (4456)	4.84 (3973)	5.13 (3116)	5.27 (2761)	5.11 (2341)	4.47 (2244)	4.32 (1174)	4.80 (953)	4.49 (845)	4.68 (797)	4.25 (585)	4.54 (430)	4.84 (319)	4.65 (301)	4.52 (153)	4.61 (143)	3.55 (134)	4.08 (50)
Male(3)	3.17 (5117)	4.82 (4697)	4.18 (4016)	3.72 (3582)	3.91 (2823)	3.77 (2529)	3.78 (2183)	3.27 (2117)	3.35 (1100)	3.41 (894)	3.51 (787)	3.09 (751)	2.94 (559)	3.00 (376)	2.98 (287)	2.35 (269)	2.76 (148)	3.55 (135)	2.88 (125)	2.17 (48)
Race:																				
White(4)	3.59 (8070)	5.52 (7430)	4.93 (6545)	4.45 (5782)	4.63 (4678)	4.57 (4126)	4.51 (3483)	3.85 (3359)	3.88 (1824)	4.21 (1514)	4.12 (1315)	4.06 (1248)	3.86 (897)	3.84 (692)	3.72 (519)	3.66 (486)	3.50 (239)	4.11 (216)	3.28 (207)	3.34 (91)
Nonwhite(5)	3.09 (2388)	4.92 (2174)	4.71 (1709)	4.04 (1584)	4.26 (1112)	4.58 (1021)	4.33 (913)	4.03 (878)	3.64 (383)	3.75 (284)	3.58 (270)	3.34 (254)	2.68 (215)	4.18 (91)	3.94 (66)	3.32 (65)	4.87 (46)	4.17 (46)	2.78 (36)	1.33 (3)
Income:																				
L. T. $15,000(6)	3.38 (1542)	5.97 (1390)	5.68 (1140)	5.07 (1021)	5.18 (795)	5.58 (689)	5.28 (537)	4.93 (514)	4.3* (298)	5.11 (230)	5.18 (199)	5.56 (180)	5.06 (125)	4.68 (94)	4.85 (61)	4.81 (59)	2.53 (19)	2.95 (19)	2.40 (15)	6.00 (6)
$15–25,000(7)	3.21 (1569)	5.29 (1452)	4.34 (1232)	4.20 (1101)	4.30 (840)	4.60 (752)	4.29 (636)	3.80 (611)	3.41 (304)	3.92 (256)	3.89 (220)	3.75 (205)	3.45 (145)	3.71 (96)	2.59 (68)	2.58 (62)	2.80 (30)	2.86 (28)	4.00 (26)	1.60 (10)
G. T. $25,000(8)	4.15 (1002)	5.96 (941)	5.18 (863)	4.29 (770)	4.58 (639)	4.39 (582)	4.38 (511)	3.71 (496)	3.71 (279)	3.64 (231)	3.65 (204)	3.80 (202)	3.54 (147)	3.44 (129)	3.38 (103)	2.37 (98)	3.58 (38)	4.35 (34)	2.00 (34)	2.67 (12)
Education:																				
High School(9)	3.70 (1073)	5.74 (1001)	5.12 (815)	4.82 (729)	5.19 (563)	5.39 (502)	4.71 (432)	4.44 (410)	3.75 (241)	4.16 (196)	4.34 (178)	4.94 (166)	3.41 (128)	3.66 (70)	3.22 (51)	3.84 (51)	2.88 (32)	3.22 (31)	4.00 (28)	3.64 (11)
Some College(10)	3.92 (1530)	6.19 (1385)	5.31 (1220)	5.03 (1079)	4.96 (825)	5.50 (727)	5.10 (605)	4.34 (583)	4.54 (259)	7.07 (207)	6.16 (187)	4.69 (173)	4.39 (124)	4.78 (102)	4.57 (70)	3.69 (64)	3.76 (33)	3.07 (30)	2.52 (27)	2.18 (11)
College(11)	3.03 (1734)	5.33 (1571)	4.58 (1383)	3.83 (1246)	4.17 (1013)	4.22 (911)	4.04 (749)	3.58 (724)	3.44 (421)	4.02 (352)	3.74 (292)	3.62 (280)	4.17 (189)	3.46 (164)	2.93 (120)	2.31 (111)	2.50 (24)	4.36 (22)	1.33 (21)	2.86 (7)
Age:																				
0–4 Years(12)	5.46 (978)	8.98 (862)	5.96 (727)	5.83 (650)	5.92 (493)	4.98 (418)	4.62 (334)	3.99 (316)	4.60 (181)	3.71 (150)	3.63 (118)	3.12 (105)	2.92 (89)	3.02 (53)	2.10 (40)	2.14 (28)	2.82 (17)	3.06 (17)	3.71 (13)	
5–19 Years(13)	2.58 (3056)	3.74 (2980)	3.79 (2473)	3.17 (2251)	3.36 (1803)	3.17 (1633)	3.65 (1442)	3.11 (1400)	3.47 (682)	3.10 (541)	3.35 (501)	2.98 (483)	2.67 (356)	3.57 (242)	3.66 (190)	2.89 (186)	2.79 (119)	3.70 (108)	2.59 (102)	1.85 (39)
20–44 Years(14)	3.43 (4613)	5.59 (4145)	5.18 (3531)	4.65 (3124)	4.94 (2384)	5.10 (2087)	4.82 (1757)	4.20 (1672)	3.77 (989)	4.09 (693)	3.95 (602)	3.98 (550)	4.14 (382)	3.89 (266)	3.75 (207)	3.85 (192)	4.27 (87)	4.15 (78)	2.89 (72)	4.48 (25)
45–54 Years(15)	3.82 (1208)	6.65 (1150)	5.19 (1026)	4.90 (896)	4.75 (724)	4.98 (668)	4.70 (584)	4.22 (565)	3.77 (301)	4.91 (255)	4.46 (217)	4.37 (217)	3.82 (176)	3.80 (120)	3.73 (104)	3.51 (98)	4.74 (54)	5.33 (54)	3.92 (50)	4.54 (22)
55 + Years(16)	4.20 (875)	6.41 (834)	5.65 (715)	4.88 (634)	5.23 (535)	5.88 (484)	5.40 (407)	4.73 (408)	4.75 (241)	6.28 (209)	5.56 (194)	5.93 (193)	4.74 (141)	4.65 (105)	4.68 (65)	4.85 (66)	3.83 (24)	3.62 (24)	3.52 (24)	3.43 (7)
Employer:																				
I(17)	3.52 (1011)	6.42 (933)	6.08 (853)	5.25 (826)	5.27 (794)	5.18 (615)	5.42 (569)	4.80 (553)	3.87 (537)	4.22 (463)	4.04 (431)	4.27 (426)	4.32 (312)	4.13 (287)	3.78 (256)	3.65 (242)				
H(18)	5.41 (664)	6.48 (584)	4.75 (584)	4.77 (583)	4.42 (580)	5.11 (502)	4.61 (494)	4.02 (493)	3.67 (392)	4.37 (362)	3.51 (360)	3.32 (360)	3.14 (358)	3.49 (118)	2.96 (115)	2.50 (110)	2.94 (109)	4.22 (109)	2.59 (101)	
Cohort:																				
A(19)	3.95 (269)	5.17 (269)	5.89 (269)	5.11 (269)	5.38 (269)	4.86 (269)	4.92 (269)	4.13 (269)	3.60 (269)	3.82 (269)	3.95 (269)	4.16 (269)	4.44 (269)	4.21 (269)	3.81 (269)	3.57 (269)				
B(20)	7.34 (200)	7.06 (200)	5.90 (200)	4.52 (200)	5.44 (200)	4.28 (200)	4.05 (200)	3.86 (200)	3.80 (200)	3.38 (200)	4.20 (200)	4.18 (200)	3.72 (200)	3.46 (200)						
C(21)	4.24 (338)	7.35 (338)	4.84 (338)	4.65 (338)	4.44 (338)	4.46 (338)	4.00 (338)	3.61 (338)	3.28 (338)	4.00 (338)	3.21 (338)	4.21 (338)	2.82 (338)							
No Survey	2.79 (6294)	4.89 (5574)	4.36 (4654)	3.84 (4078)	3.74 (3265)	3.70 (2747)	3.56 (2265)	3.39 (2130)	3.72 (1220)	4.65 (882)	3.43 (783)	2.94 (728)	2.81 (520)	4.43 (297)	3.21 (248)	3.46 (212)	2.14 (84)	4.21 (73)	2.45 (68)	4.66 (31)

We have chosen to analyze our data in a clear, straightforward manner so as to avoid some of the methodological problems of data adjustment that may have existed in past studies. First, we have not adjusted our data for seasonality or any other temporal factors. (A separate examination of the data indicated that seasonal influences are minor in comparison with the overall changes in utilization taking place in the start-up period.) Second, we present and analyze our results in simple graphic and tabular forms that can be easily understood and verified. Finally, we have adopted two conventions to increase the clarity of the results: 1) Our plots of utilization rates over time exclude data for population sample sizes below 100; and 2) First quarter utilization rates are excluded because they were depressed to meaningless levels by differential times of enrollment during the first quarter, difficulties of new enrollees in accessing the system, waiting times for initial appointments, etc. (Complete data histories and population sample sizes are given in Table 1.)

Results

Total Population Start-Up

Our results indicate the existence of a substantial start-up effect for the total study population. The characteristics of the start-up are illustrated in Figure 1, in which the average number of provider visits each quarter (annualized) are plotted against the length of plan enrollment in quarters. As can be seen, there is a clear downward trend in utilization. The duration of the start-up effect is notable; the downward trend appears to continue through quarter 19. The magnitude of the start-up is also appreciable. There were 5.37 annualized visits in quarter 2, but only 3.23 visits in quarter 19, yielding an absolute reduction in the level of utilization of over two visits during the 5-year study period. This represents a 40 per cent reduction in utilization.‡‡

Perusal of Figure 1 will indicate that the reduction in the utilization rate is relatively larger in the earlier quarters and tends to slow down after quarter 8 or 9. This reduction is also indicated in the first row of Table 2 (Study Population). Columns A, B and C show the average number of provider visits per quarter (annualized) for quarters 2, 9 and 13, respectively. Column D shows the *percentage* reduction in utilization that occurs between quarters 2 and 9, and column E indicates the percentage reduction in utilization between quarter 2 and quarter 13. The *absolute* reduction in the number of visits between quarters 2 and 9, and between quarters 2 and 13, are displayed in columns F and G, respectively.

Referring to these figures, we see that the percentage reduction between quarters 2 and 9 was 28.30 per cent, representing an absolute reduction of 1.52 visits. The comparison of quarters 2 and 13 yields only slightly larger numbers, 32.77 per cent, or 1.76 visits, indicating the slower rate of reduction that appears to continue to the end of the plot at quarter 19.

tions of this are not clear, however, since many other factors influence actual access importantly, such as administrative delays, variations in staff availability and appointment waiting time, and these factors vary over time and between plans. In our study, the quarter measures seem to yield virtually the same result; the start-up plot for the total population using a close approximation to the exact quarter definition is identical in all key respects to the plot in Figure 1. This may not be true in all cases, however, so we urge the consistent application of the calendar quarter measure in future studies.

‡‡ Straightforward tests of statistical significance cannot be performed on these differences in utilization rates because, owing to the definition of cohorts in the longitudinal analysis, the study population size decreases in each successive quarter. We have chosen not to adjust the population to facilitate testing because it would be confusing and would provide little relevant information that is not already contained in the graphical and tabular presentations.

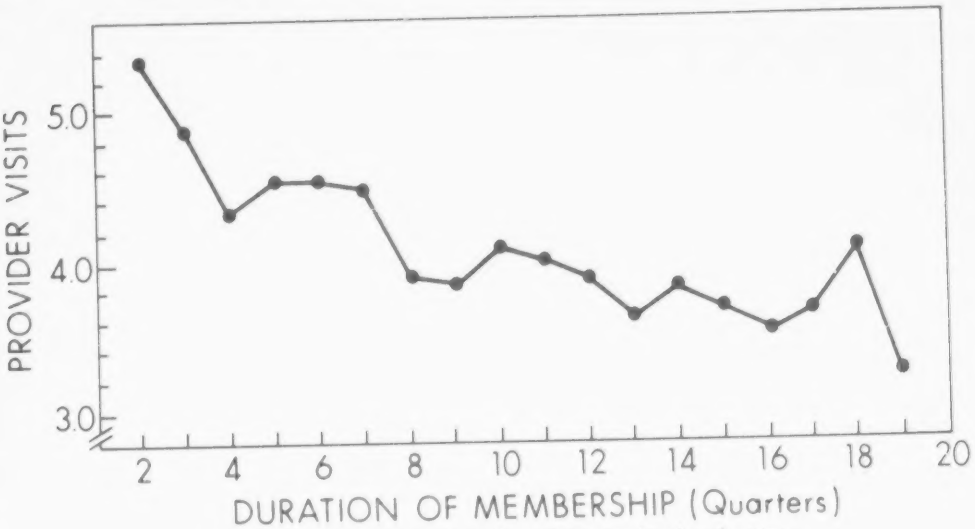

FIG. 1. Utilization rate of enrollee versus membership duration.

Close inspection of Figure 1 will also indicate several upward irregularities in the start-up trend. These can be seen as temporary increases in utilization that center on or about quarters 6, 10, 14 and 18. The periodicity of these "bumps"—occurring as they do every four quarters after quarter 2—suggests the existence of a systematic cause, a topic that will be discussed later in this paper.

Start-Ups Among Subgroups

Our results also indicate the existence of a pronounced start-up effect for different subgroups of the total population that are defined by sex, race, income, education and age, as well as for different employers and cohort groups. The characteristics of these different start-ups, however, vary between subgroups in several ways.

Sex. The utilization patterns for the female and male subgroups of our study are shown in Figure 2. Beginning with quarter 2, there is a definite downward trend in utilization that is once again interrupted by periodic bumps that peak during or close to quarters 6, 10, 14 and 18. The durations of the start-up effects, however, seem to differ between females and males. Although the bumps confuse the graphic interpretations somewhat, the females' rate of utilization appears to flatten out and vary at a roughly constant level after quarter 9. The start-up trend for males, on the other hand, appears to continue through quarter 16. The numbers given in row 2 of Table 2 (Female) also reflect the apparent development of this "steady state." The reductions between quarter 2 and quarter 9 of 1.54 visits, or 26.28 per cent, are nearly as large as those obtained four quarters later in the comparison between quarter 2 and quarter 13 (1.61 visits, or 27.47 per cent). The continuous reductions in male utilization are also suggested by the figures; the 30.5 per cent reduction in utilization achieved between quarters 2 and 9 is followed by a 39.0 per cent reduction between quarters 2 and 13.

Race. Figure 3 shows the start-up effects in the utilization behavior of the racial subgroups of "white" and "nonwhite" enrollees. Looking first at the start-up plot for whites, the rates of reduction appear to be

TABLE 2. Changes in Annualized Number of Provider Visits over Time

	(A) Q_2	(B) Q_6	(C) Q_{13}	(D) % Reduction in Utilization: Q_2 to Q_6	(E) % Reduction in Utilization: Q_2 to Q_{13}	(F) Absolute Reduction in Utilization: Q_2 to Q_6	(G) Absolute Reduction in Utilization: Q_2 to Q_{13}
Study Population(1)	5.37	3.85	3.61	28.30	32.77	1.52	1.76
Sex:							
Female(2)	5.86	4.32	4.25	26.28	27.47	1.54	1.61
Male(3)	4.82	3.35	2.94	30.50	39.00	1.47	1.88
Race:							
White(4)	5.52	3.88	3.86	29.71	30.07	1.64	1.66
Nonwhite(5)	4.92	3.64	2.68	26.02	45.53	1.28	2.24
Income:							
L. T. $15,000(6)	5.97	4.34	5.06	27.30	*	1.63	*
$15–$25,000(7)	5.29	3.41	3.45	35.54	*	1.88	*
G. T. $25,000(8)	5.96	3.71	3.84	37.75	*	2.25	*
Education:							
High School(9)	5.74	3.75	3.41	34.67	*	1.99	*
Some College(10)	6.19	4.54	4.39	26.66	*	1.65	*
College Degree(11)	5.33	3.44	4.17	35.46	*	1.89	*
Age:							
0–4 Years(12)	6.98	4.60	2.92	34.10	*	2.38	*
5–19 Years(13)	3.74	3.47	2.67	7.22	*	0.27	*
20–44 Years(14)	5.59	3.77	4.14	32.56	*	1.82	*
45–54 Years(15)	6.65	3.77	3.82	43.31	*	2.88	*
55 + Years(16)	6.41	4.75	4.74	25.90	*	1.66	*
Employer:							
I(17)	6.42	3.87	4.32	39.72	*	2.55	*
H(18)	6.48	3.67	3.14	43.36	*	2.81	*
Cohort:							
A(19)	5.17	3.60	4.44	30.37	*	1.57	*
B(20)	7.06	3.80	3.72	46.18	*	3.26	*
C(21)	7.35	3.28	2.82	55.37	*	4.07	*

FIG. 2. Sex: utilization rate of enrollee versus membership duration.

greater in the earlier quarters, followed by a more gradual downward trend of long duration that persists through quarter 19. The slowing of the downward trend is also illustrated in Table 1; comparing the numbers for quarters 2, 9 and 13 shows that most of the reduction in provider visits occurred early. Once again, the bumps in utilization center in or around quarters 6, 10, 14 and 18.

The start-up pattern for nonwhites is generally more precipitous than that for whites. This can be seen both in Figure 3 and in Table 1. The overall reduction in number of visits between quarters 2 and 13 is substantially greater for nonwhites. Figure 3 also indicates that, for most of the history, the rate of utilization in absolute terms is greater for whites than for nonwhites. As can be seen, bumps also appear in the nonwhite graph at quarters 6 and 10.

Income. Figure 4 shows the start-up plots for three subgroups of subscribers defined by three different family income categories ("less than $15,000 per year," "$15,000 to $25,000," "and greater than $25,000"). Unfortunately, the greater variability in the data associated with smaller sample sizes reduces clarity and begins to confuse our graphic analyses in several ways. First, the trends themselves are harder to determine. Second, the bumps in utilization seem to peak at slightly different points, and the troughs no longer coincide. This also makes it hard to compare the magnitude of the utilization reductions between subgroups on the graphs; evaluating changes between quarters 2 and 9 re-

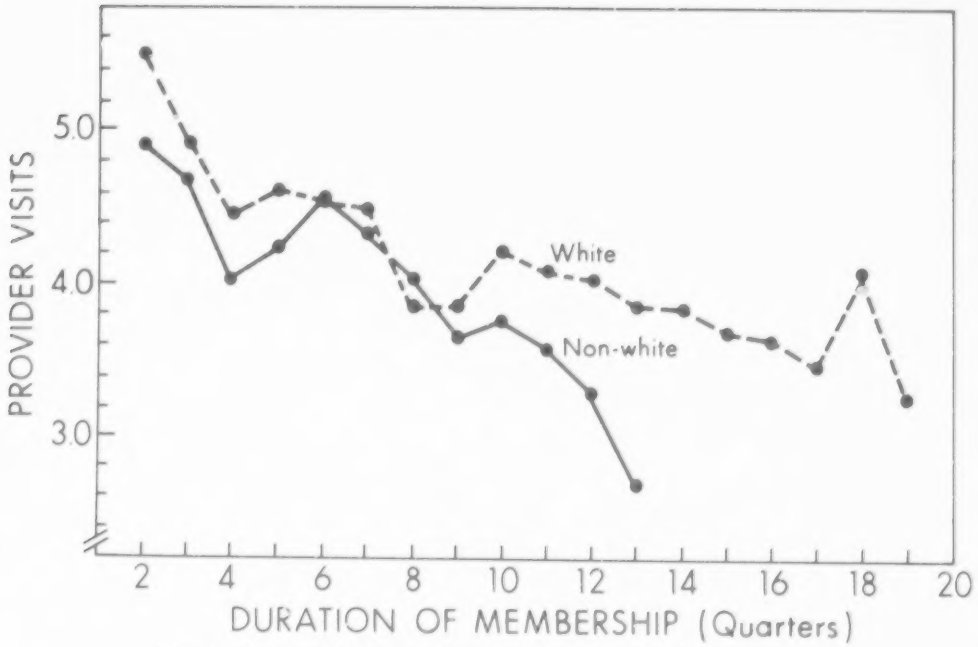

FIG. 3. Race: utilization rate of enrollee versus membership duration.

mains useful, but comparisons between quarters 2 and 13 are misleading.§§ Notwithstanding the increasing difficulty of interpretation, some similarities and differences are evident. All three graphs show definite start-up effects occurring between quarters 2 and 9. The magnitude of the start-up is smaller for enrollees earning less than $15,000 than it is for others. The duration of the start-up for those earning less than $15,000 is also different, apparently ending after quarter 9, whereas the other two start-ups seem to continue to quarter 16. Finally, the rates of utilization for these two higher-income categories are roughly the same over time, both being well below the utilization of individuals earning less than $15,000.

Education. The start-up plots for three different subgroups defined by the education level of the subscriber ("high school or less," "some college" and "college degree or more") are presented in Figure 5. As with income subgroups, all three plots seem to show a start-up effect from quarter 2 through quarters 8 or 9. Then the "some college" graph no longer decreases systematically. The other two start-ups seem to continue through quarters 15 and 16. As to the magnitude of the start-ups, the figures in Table 2 indicate that the subgroups of "high school or less" and "college degree or more" had roughly comparable results (34.67 per cent and 35.46 per cent, respectively) and that these were appreciably greater than those of the subgroup "some college" (26.66 per cent). In terms of absolute magnitude of utilization, "some college" and "high school or less" are comparable through quarter 8, while "college degree or more" shows consistently lower rates through quarter 12. Finally, note that the bumps peak at quarters 5 or 6 and quarters 10, 11 or 12.

§§ An asterisk (*) appears in columns E and G of Table 2 in these cases.

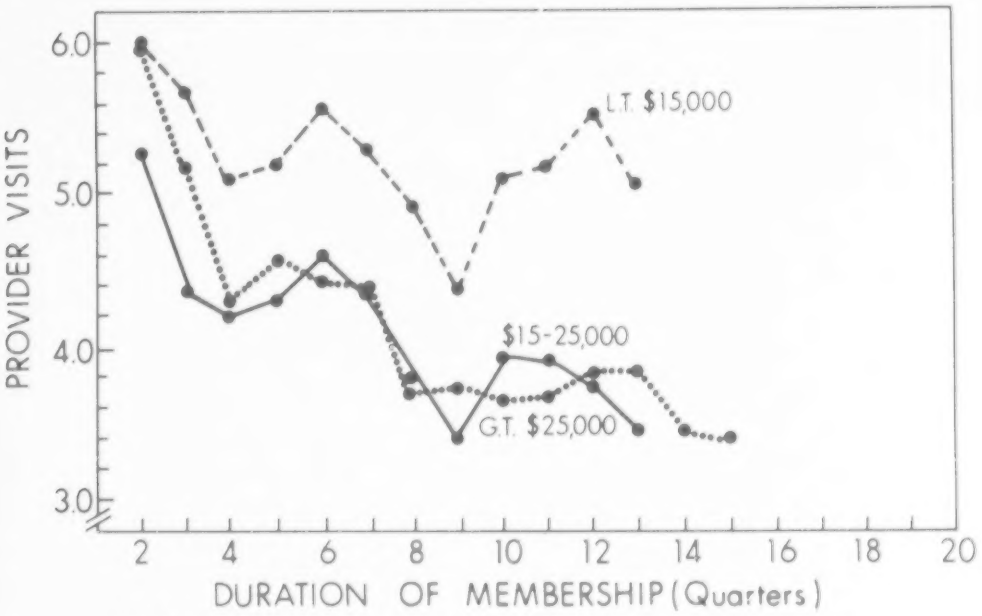

FIG. 4. Family Income: utilization rate of subscriber versus membership duration.

Age. Start-up plots are shown in Figure 6 for the following five age categories: 0 through 4 years of age, 5 through 19, 20 through 44, 45 through 54, and 55 or older. The age category of 0 through 4 years has the most dramatic start-up. It continues from quarter 2 to the end of the plot in quarter 12. The magnitude is appreciable, yielding reductions of 34.10 per cent between quarters 2 and 9. Rather well-defined bumps occur in quarters 5 and 9.

The age category of 45 through 54 years has the next most pronounced start-up effect, with a clear downward trend to quarter 9, by which time there has been a reduction of 2.88 annualized visits, or 43.31 per cent. Bumps occur at quarters 6 and 10.

The plot for the age category of 20 through 44 years shows a start-up effect through quarter 9, with a reduction between quarters 2 and 9 of 1.82 visits, or 32.56 per cent.

The data for the age category of 55 years and older document a very irregular utilization pattern; the number of annualized provider visits varies between roughly 6.5 and 3.5 from quarter to quarter, thus reflecting the highest level of utilization of any age group during much of the 5-year period. Although there is a hint of a start-up between quarters 2 and 9, the large bump that peaks at quarter 6 and the series of abruptly higher utilization levels that occur after quarter 9 confuse our graphic interpretation.

The plot for the age group of 5 through 19 years shows an attenuated start-up. As can be seen, the number of visits seems to drift downward irregularly from quarter 2 to quarter 13 before the plot becomes quite erratic. Note that for most of their history the absolute levels are well below those of other age groups.

Employer and Cohort Groups

For purposes of planning, PGP managers will be interested in the start-up ef-

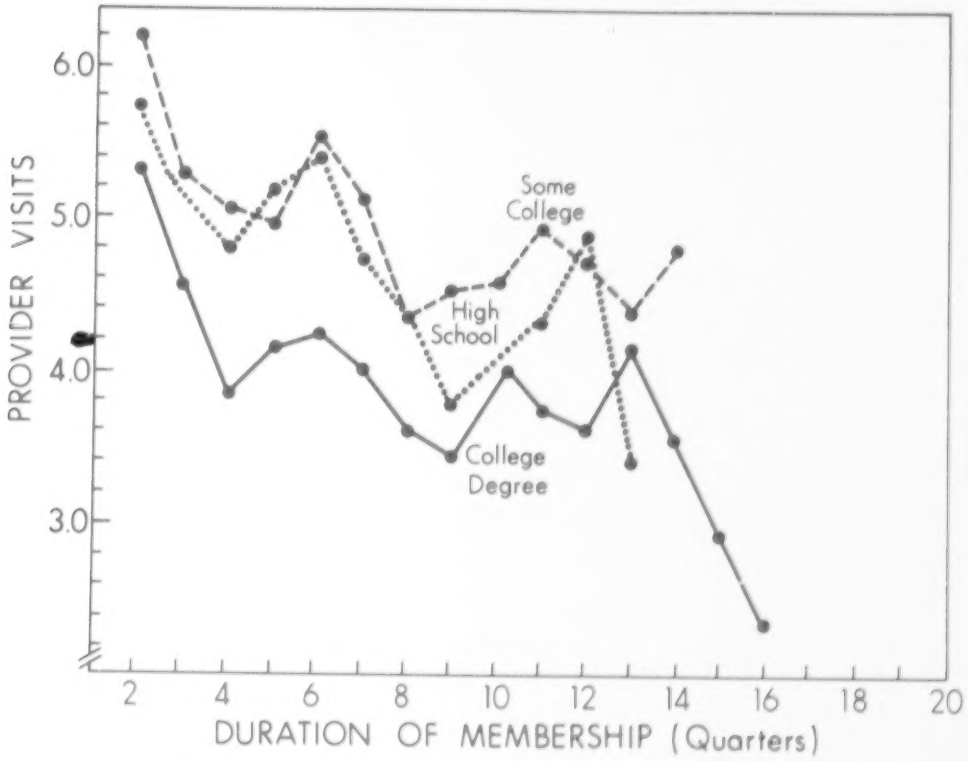

FIG. 5. Subscriber's Education: utilization rate of subscriber versus membership duration.

fects exhibited by natural enrollment groups that are drawn from the same employer or by cohorts of individuals who join the plan at the same time. We have, therefore, examined the start-ups of two employer groups that were among the largest and earliest to contract with MCG and those of three calendar cohorts who were among MCG's largest and earliest subscribers.

Figure 7 shows that the start-up effect exists for both employers. The downward trends in utilization are again disrupted by bumps that peak at quarters 6 or 7, 10 and 13 or 14, and 18. The duration of the start-up is appreciable in both graphs, with the employer I plot showing a downward trend throughout its entire history. The employer II start-up seems to continue through quarter 16. The rates of reduction in provider visits appear to be roughly the same early in the start-up, but after quarter 9 the employer I graph slows, while the graph for employer II continues downward rapidly. This is also seen in Table 1.

The start-up graphs for the three different cohorts are shown in Figure 8. The rates of decline for cohorts B and C seem to be somewhat greater than that for cohort A initially, but by quarter 9 the rates for all three groups are within 0.52 annualized provider visit of one another. The magnitude of the reductions between quarters 2 and 9 are all large, with visits being reduced by 1.57, 3.26 and 4.07, for percentage reductions of 30.37, 46.18 and 55.37 per cent, respectively, for A, B and C. Cohort A, however, appears actually to

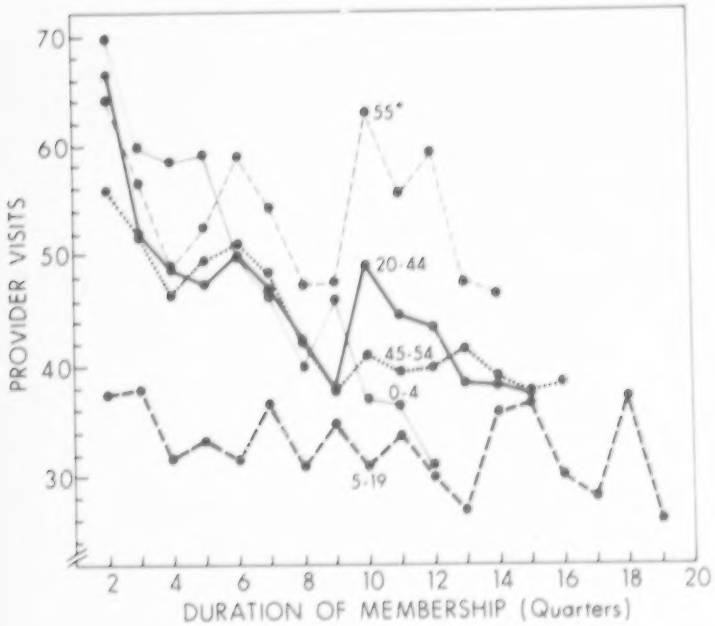

FIG. 6. Age: utilization rate of enrollee versus membership duration.

begin its start-up at quarter 3 instead of quarter 2, for reasons that we cannot explain. If, for this reason, we use the quarter 3 value and compare it with quarter 9, there is a reduction of 2.29 visits, or 38.88 per cent, which is closer to that achieved by B and C. Note also that bumps in utilization occur in each graph but that peaks are not located together, occurring as they do in quarters 5, 6, 7, and 10 or 11.

Discussion

The results reported above document the existence of a major start-up effect whose strength and persistence are notable; the study population as a whole and virtually all subgroups of the study population had appreciable reductions in utilization rates over the 5-year study period, and these results also held across different cohorts and employers.

How general or widespread is the phenomenon? Although this is an empirical question, some factors argue for generality. Consider first its causes. We expect that the behaviors underlying the start-up phenomenon are normal consequences of the utilization incentives inherent in prepaid group practice. With reduced access barriers, enrollees can cause high initial utilization by testing the benefits of the plan, by having periodic checkups for which they are now covered, and so on.[2] The PGP organization can also stimulate high initial utilization by encouraging initial screenings, detecting and treating preexisting illnesses, encouraging greater awareness of health status and providing health education to enrollees, and through other administrative practices and policies.

The comparability of our study PGP with many others in the United States also suggests a widespread start-up effect. For instance, the Medical Care Group has roughly 24,000 enrollees, making it comparable in size to over 100 other PGPs in the United States. It is a relatively young organization, having been in operation for 10 years. Approximately 200 other plans

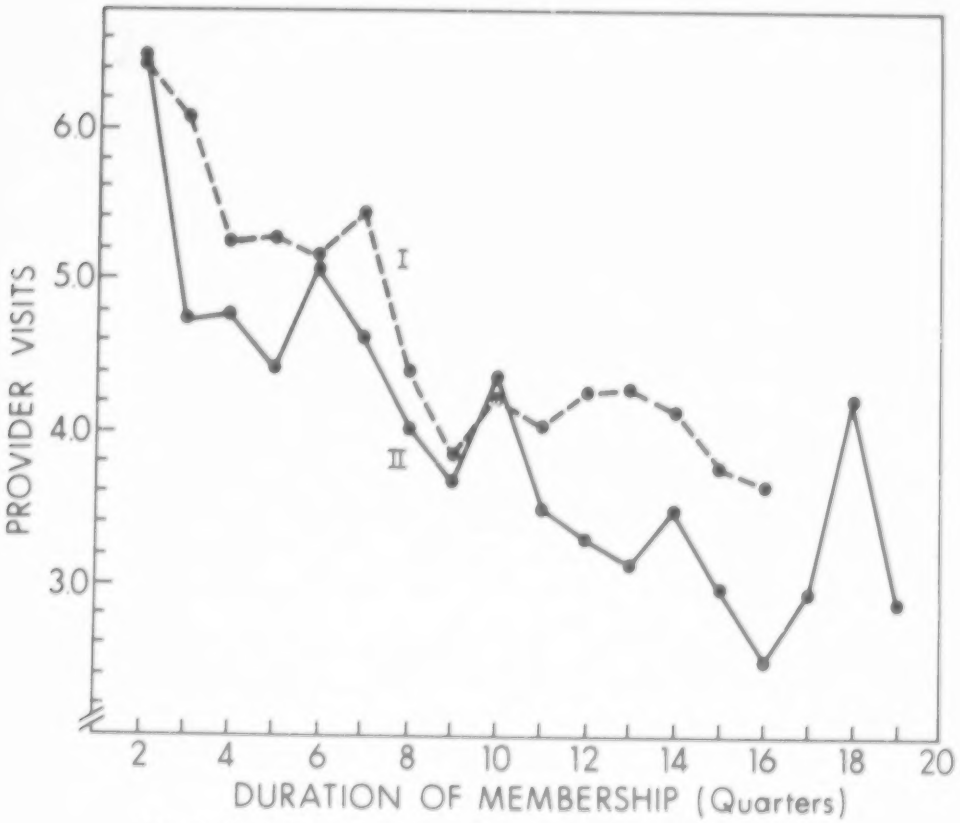

FIG. 7. Employer: utilization rate of enrollee versus membership duration.

have been in operation less than 10 years, and 50 of these are between six and nine years old. Overall utilization figures are also similar. MCG members, taken as a whole, have roughly 3.6 provider visits per year. This is quite comparable to the overall average of 3.4 visits by other PGPs in 1979.[12] MCG is also similar to other plans in its broad SES composition, urban location, broad benefit package and absence of financial mechanisms that could restrict utilization.

We do not presume, however, that sizable start-ups will occur in all PGPs. Just as plans are able to stimulate high initial utilization, they can also dampen it rather effectively through the use of different policies or administrative practices. These practices could include applying such financial barriers as deductibles, restricting the range of covered benefits, discouraging initial physical examinations, allowing long waiting lines to develop and reducing access in other ways. To the degree that such practices exist, they might be more prevalent in older and larger PGPs that have had more time to implement them and less financial concern about positive incentives for enrollment growth.

In summary, then, we suggest as a *working hypothesis* to guide future studies that start-ups will be found widely, especially

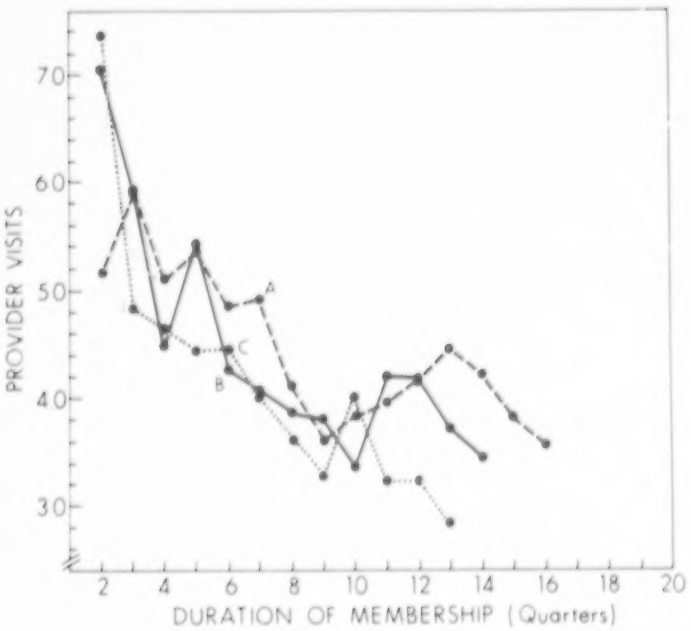

FIG. 8. Cohort: utilization rate of enrollee versus membership duration.

among young and developing PGPs. Their magnitude, duration and other characteristics may, however, vary appreciably from plan to plan.

The periodic bumps in utilization found throughout our results also deserve discussion. Recall that these bumps occurred roughly every four quarters after quarter 2—centering around quarters 6, 10, 14 and 18—and that they account for a sizable amount of utilization.

We were not able to analyze directly or document the causes of this phenomenon. We have some strong suspicions, however, that lead us to suggest, as another working hypothesis, that they are caused by the federally mandated procedure of notifying employees annually of their health benefits and open enrollment dates. We suspect that these annual notifications could be stimulating increased utilization in one or more of the following ways: 1) some persons are reminded to follow up on previous treatment; 2) others may be induced to take further advantage of their prepaid benefits through, for example, scheduling a physical examination or consulting a physician about their general health status; 3) the notification may heighten the anxiety of some "worried well" and thereby stimulate a temporary increase in their utilization of health care services. Other examples could be given, but the hypothetical mechanism would be the same: annual notification could increase enrollee awareness of their medical benefits and their health status, and this heightened awareness could be translated into more provider visits. More visits could result in the treatment of yet undiscovered illness with follow-up visits. The overall result of such a process could cause the bumps in utilization that occur in our data roughly every 12 months.

Implications

One of the more important policy implications of the start-up effect concerns financial incentives for enrolling new mem-

bers. The rate of diffusion of prepaid group practice would perhaps be increased if some form of reimbursement were provided for the costs of a start-up. Assume for argument's sake that future research shows that significant start-up effects normally occur in most PGPs and that associated costs are large. Administrators might then be reluctant to expand their plans beyond financially viable or breakeven levels because enrolling new members would either increase the average per capita cost, implying higher premiums, or reduce the real service capacity (per enrollee) of the plan. In either case there is a disincentive for plan expansion. Furthermore, such disincentives may be selectively larger for some socioeconomic groups than for others. This type of pernicious effect could result, for instance, if there is a belief or expectation that certain racial minorities or socioeconomic groups have higher levels of unmet medical needs that would translate into larger or longer start-ups.

One possible solution to this problem would be to provide a financial incentive for the enrollment and start-up of new groups that goes above the average premium. If done with private funds, for example, PGPs could be urged to charge a "start-up premium" to new employers during the first years of enrollment. With public funds it would be necessary to develop some start-up incentive to be applied above the established rates of reimbursement by Medicare, Medicaid or other forms of public financing.

We will not be able to judge the appropriateness or effectiveness of such start-up incentives until a number of important questions are answered by future studies. For example, does the higher initial rate of utilization during a start-up represent effective and appropriate care, or is it actually *overutilization* that should be discouraged? If it is appropriate, how can the size and duration of the incentives be established in an equitable manner? Other conceptual problems also exist, though most of them are similar to those usually encountered in public financing of health care delivery.

The regular bumps that occurred in our start-up data could also have policy implications. If future study confirms our hypothesis that open enrollment notification and the annual statement of benefits are responsible for such bumps, it would be wise to reconsider the merit and form of this requirement. Once again, there are some nettlesome questions: do the bumps represent effective and appropriate utilization, or only some form of overutilization related to anxiety? In either case, the *form* of the current procedure needs to be rethought if it is resulting in unintended health utilization behavior. If the bumps represent inappropriate utilization, ways should be found to minimize or eliminate these behavioral consequences. If the utilization is appropriate, perhaps the method of notification should be redesigned to strengthen its motivational effect.

In addition to policy implications, start-ups have important administrative consequences for a large variety of activities related to the design, planning and control of PGPs. In conducting these activities, planners and managers rely heavily on some average rates of utilization of services by their enrolled population, such as the number of visits per enrollee per year. This average utilization rate becomes, in managerial parlance, a "standard" for translating expected patient demand for services into the required physical facilities, medical staff and equipment necessary to provide these services. Hence, staffing decisions, such as the number of physicians, physician's assistants, RNs, technicians and administrative personnel to employ at any point in time, are made using these standards. They are also used in a large number of other planning and monitoring activities. Rate setting is one obvious

example, since these standards of utilization are employed to estimate the base from which capitation rates and premiums are ultimately determined. Marketing activities are also affected because the standards are used to estimate how much unused capacity or delivery capability a plan would be able to reserve for new enrollees in the future. These are just a few of the activities that rely on standards of utilization.

References

1. Broida JH, et al. Impact of membership in an enrolled, prepaid population on utilization of health services in a group practice. N Engl J Med 1975;292:780.

2. Yesalis CE, Bonnet PD. The effect of duration of membership in a prepaid group health plan on the utilization of services. Med Care 1976;14:1024.

3. Mulloody JP, Freeborn DK. The effect of length of membership upon the utilization of ambulatory care services: a comparison of dis-advantaged and general membership populations in a prepaid group practice. Med Care 1979;17:922.

4. Avnet HH. Physician service patterns and illness rates. Group Health insurance, Inc., 1967.

5. Robertson RL. Comparative medical care use under prepaid group and free choice plans: a case study. Inquiry 1972;9:70.

6. Shragg H, et al. Low-income families in a large scale prepaid group practice. Inquiry 1973;10:52.

7. Sparer G, Anderson A. Utilization and cost experience of low-income families in four prepaid group practice plans. N Engl J Med 1973;289:67.

8. Forthofer RN, Glasser JH. Utilization of services of an HMO by new enrollees. AJPH 1979;69:1127.

9. Baloff N, Becker SW. On the futility of aggregating individual learning curves. In: Schultz, ed. The Science of Psychology: Critical Reflections. New York: Appleton-Century-Crofts, 1970.

10. Perkoff GT. Changing health care: perspectives from a new medical care setting. Ann Arbor; Health Administration Press, 1979.

11. Wilcox V. Summary: 1978 Medical Care Group survey. Unpublished monograph. Division of Health Care Research, Washington University, Spring 1980.

12. National HMO Census of Prepaid Plans: 1979. U.S. Department of Health, Education and Welfare, Public Health Service, Office of Health Maintenence Organizations, Division of Program Promotion.

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Communications

Commentary on "Membership Duration and Utilization Rates in a Prepaid Group Practice," by Mary Jane Griffith and Nicholas Baloff

JOHN P. MULLOOLY, PH.D.*

GRIFFITH AND BALOFF present important data on the use of health services by new members of a young, average-sized, urban PGP program. However, some problems with their methodology raise questions about the validity of their conclusions.

The question of the magnitude of error introduced by using the approximate calendar quarter definition of duration of membership rather than the exact definition employed by Mullooly and Freeborn and by Forthofer, Glasser and Light is probably of minor importance compared with other issues raised by the methodology of this article. Before discussing these other matters, it is worth mentioning that if one applies the approximate calendar quarter definition of duration of membership, the actual number of person-months of membership should be used in the denominator of the first-quarter rate. Since there is no information on the relative frequency of monthly enrollments during the first quarter of membership, the adjusted first-quarter rates, assuming a uniform distribution (i.e., an average membership of two months), become 5.22 for respondents, 4.19 for nonrespondents and 4.84 overall. Computing first-quarter rates this way contributes to a more complete description of the start-up phenomenon and allows for comparisons of actual first-quarter rates among PGPs.

The following methodological problems should be dealt with in designing future studies of start-up effects in PGPs: 1) selection biases due to excluding disenrolled members and nonrespondents from the analyses; 2) inherent statistical variability of utilization rates; and 3) variations in the seasonal mix of the study population by duration of membership due to uneven quarterly enrollments. These problems have not been addressed by the authors of this study.

In order to facilitate discussion of these methodological problems, I have reconstructed the enrollment pattern of the study population. Table A shows the numbers of members who joined MCG during the calendar quarters of 1973 through 1977. These data were obtained by successive subtractions of the respondent and nonrespondent population figures given in Table 2 (in Griffith and Baloff). For example, the 98 respondents who had 20 quarters of membership joined during the first quarter of 1973. The difference between

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TABLE A.

Calendar Quarter	No. Enrollees			% Non-resp.	Calendar Quarter	No. Enrollees			% Non-resp.	Calendar Quarter	No. Enrollees			% Non-resp.
	Total	Resp.	Non-resp.			Total	Resp.	Non-resp.			Total	Resp.	Non-resp.	
1973 1	129	98	31	24.0	1975 1	622	404	218	35.0	1977 1	2,429	1,616	813	33.5
2	198	161	37	18.7	2	129	84	45	34.9	2	1,493	917	576	38.6
3	24	19	5	20.8	3	314	215	99	31.5	3	2,299	1,379	920	40.0
4	34	23	11	32.4	4	765	427	338	44.2	4	1,599	879	720	45.0
										Total	17,024	10,730	6,294	37.0
1974 1	397	269	128	32.2	1976 1	2,997	2,087	910	30.4					
2	62	36	26	41.9	2	298	163	135	45.3					
3	259	200	59	22.8	3	1,238	766	472	38.1					
4	561	338	223	39.8	4	1,177	649	528	44.9					

the number of respondents with at least 19 quarters of membership and those with 20 quarters (i.e., 259 − 98 = 161) represents the number who joined during the second quarter of 1973.

By moving these enrollment cohorts through time, the correspondence between calendar quarter or season and quarter of membership can be determined. For example, the 20th quarter of membership for the 98 respondents who joined during JFM of 1973 occurred during OND of 1977. Following these 98 respondents back through time, it is seen that their 19th quarter of membership occurred during JAS of 1977, the 18th during AMJ of 1977, the 17th during JFM of 1977, the 16th during OND of 1976, etc. Table B shows the respondent and total study populations by duration of membership and calendar quarter of season.

It is seen from Table A that the percentage of nonrespondents increased from approximately 20 per cent for the first three enrollment cohorts of 1973 to approximately 40 per cent for the last three enrollment cohorts of 1977. From Table 2 (in Griffith and Baloff), it may be seen that the percentage of nonrespondents decreases with duration of membership. Nonrespondents constituted approximately 35 per cent of the population with 1–6 quarters of membership and approximately 22 per cent of the population with 17–20 quarters of membership. Given this association between response rate and duration of membership, and the fact that nonrespondents had lower rates than respondents, analysis of the relationship between utilization rate and duration of membership should be based on the entire study population, not just on the respondents.

Since the authors have not provided information on the variability of the rates, I have estimated the standard deviation of an annualized utilization rate to be approximately six visits per year, based on comparable data reported by Forthofer and

TABLE B.

Duration of Membership (Quarter)	Calendar Quarter (Season) 1 (J, F, M) No.	100 p1	2 (A, M, J) No.	100 p2	3 (J, A, S) No.	100 p3	4 (O, N, D) No.	100 p4	Total	%
1 R	4,474	41.7	1,361	12.7	2,579	24.0	2,316	21.6	10,730	100.0
R + NR	6,574	38.6	2,180	12.8	4,134	24.3	4,136	24.3	17,024	100.0
2 R	1,437	14.6	4,474	45.4	1,361	13.8	2,579	26.2	9,851	100.0
R + NR	2,537	16.4	6,574	42.6	2,180	14.1	4,134	26.8	15,424	100.0
3 R	1,200	14.2	1,437	17.0	4,474	52.8	1,361	16.1	8,472	100.0
R + NR	1,835	14.0	2,537	19.3	6,574	50.1	2,180	16.6	13,126	100.0
4 R	444	5.9	1,200	15.9	1,437	19.0	4,474	59.2	7,555	100.0
R + NR	687	5.9	1,835	15.8	2,537	21.8	6,574	56.5	11,633	100.0
5 R	2,858	48.1	444	7.5	1,200	20.2	1,437	24.2	5,939	100.0
R + NR	4,145	45.0	687	7.5	1,835	19.9	2,537	27.6	9,204	100.0
6 R	788	14.9	2,858	54.0	444	8.4	1,200	22.7	5,290	100.0
R + NR	1,360	16.9	4,145	51.6	687	8.6	1,835	22.9	8,027	100.0
7 R	434	9.6	788	17.4	2,858	63.2	444	9.8	4,524	100.0
R + NR	597	8.8	1,360	20.0	4,145	61.1	687	10.1	6,789	100.0
8 R	281	6.4	434	10.0	788	18.1	2,858	65.5	4,361	100.0
R + NR	389	6.0	597	9.2	1,360	21.0	4,145	63.9	6,491	100.0
9 R	771	33.9	281	12.4	434	19.1	788	34.7	2,274	100.0
R + NR	1,148	67.1	389	11.1	597	17.1	1,360	38.9	3,494	100.0
10 R	361	19.5	771	41.7	281	15.2	434	23.5	1,847	100.0
R + NR	595	21.8	1,148	42.1	452	16.6	597	21.9	2,729	100.0
11 R	219	13.4	361	22.1	771	47.2	281	17.2	1,632	100.0
R + NR	283	11.7	595	24.6	1,148	47.5	389	16.1	2,415	100.0
12 R	197	12.7	219	14.1	361	23.3	771	49.8	1,548	100.0
R + NR	260	11.4	283	12.4	595	26.0	1,148	50.2	2,286	100.0
13 R	367	32.1	197	17.2	219	19.1	361	31.6	1,144	100.0
R + NR	526	31.6	260	15.6	283	17.0	595	35.8	1,664	100.0
14 R	23	2.9	367	45.5	197	24.4	219	27.2	806	100.0
R + NR	34	3.1	526	47.7	260	23.6	283	25.7	1,103	100.0
15 R	19	3.1	23	3.8	367	60.6	197	32.5	606	100.0
R + NR	24	2.8	34	4.0	526	62.3	260	30.8	844	100.0
16 R	161	28.2	19	3.3	23	4.0	367	64.4	570	100.0
R + NR	198	25.3	24	3.1	34	4.3	526	67.3	782	100.0
17 R	98	32.6	161	53.5	19	6.3	23	7.6	301	100.0
R + NR	129	33.5	198	51.4	24	6.2	34	8.8	385	100.0
18 R	0	0.0	98	35.3	161	57.9	19	6.8	278	100.0
R + NR	0	0.0	129	36.8	198	56.4	24	6.8	351	100.0
19 R	0	0.0	0	0.0	98	37.8	161	62.2	259	100.0
R + NR	0	0.0	0	0.0	129	39.4	198	60.6	327	100.0
20 R	0	0.0	0	0.0	0	0.0	98	100.0	98	100.0
R + NR	0	0.0	0	0.0	0	0.0	129	100.0	129	100.0

R = respondents.

R + NR = respondents + nonrespondents.

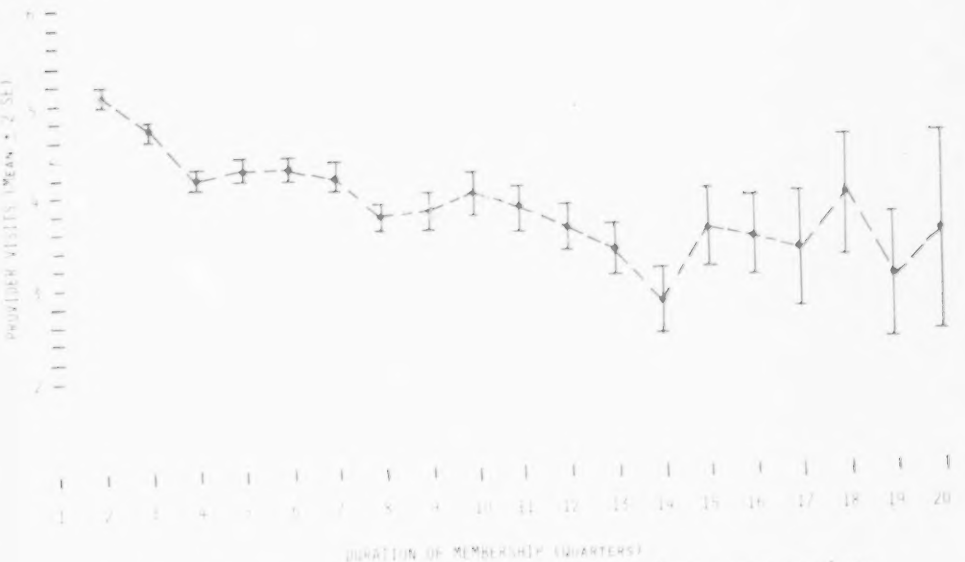

FIG. A. Utilization rate versus membership duration; respondents + nonrespondents.

Glasser. Using this estimate, I have placed approximate 95 per cent confidence limits around the mean rates for the study population (respondents and nonrespondents) (Fig. A). It is seen that the apparent decline in provider visit rate is limited to the first eight quarters of membership and that the magnitude of the variability inherent in the

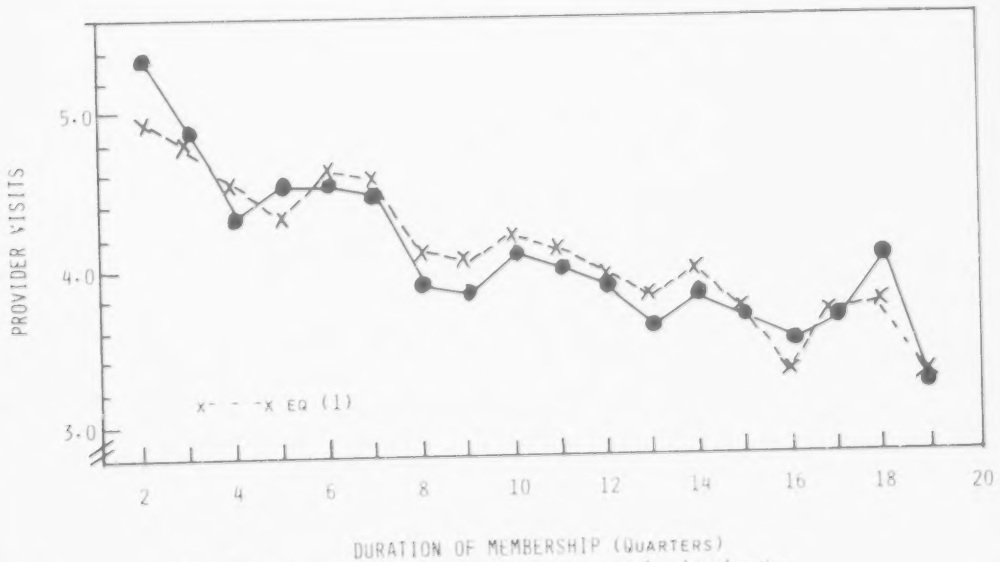

FIG. B. Utilization rate of respondents versus membership duration.

utilization rates makes it inappropriate to attach importance to subsequent drops in the rate.

Furthermore, the decrease over the early quarters of membership may in part be due to a selection bias introduced by excluding members who terminated or disenrolled during the study period. Although MCG is reported to have had a low disenrollment rate, from 2 to 5 per cent of the population per year, it should be noted that the majority of disenrollments from PGP programs occur among members with short durations of membership and that the probability of disenrollment decreases with time in the program. Also, unpublished data from the Kaiser Foundation Health Plan of Oregon indicate that terminated members with short durations of membership have substantially lower utilization rates than members who remain in the program. The expected effect of including disenrolled members in the analysis would be a moderation of the decline in utilization rate over the early quarters of membership. Valid assessment of the magnitude of the start-up phenomenon requires elimination of this selection bias.

Paired tests based on within-subject comparisons of level of use during intervals of duration of membership provide an appropriate means of assessing the statistical significance of changes in utilization rates.

The authors suggest that the observed pattern of periodic "bumps" in their utilization data was caused by annual notification of health benefits and open enrollment dates. An alternative explanation supported by their data is that this periodic variation is attributable to seasonal variation in utilization. From Table B it is seen that there was a great deal of variation in the seasonal mix of the MCG population by duration of membership and that this variation was periodic, with a period of four quarters of membership. To illustrate this point quantitatively, the sequence of utilization rates for respondents during quarters 2 through 20 was fit by ordinary least squares to a linear function of duration of enrollment (qrt) and the proportions (p1, p2, p3, p4) of the respondent population for which the qrt^{th} quarter of membership occurred during JFM, AMJ, JAS, OND, respectively. The resulting regression equation,

$$\text{rate} = 5.143 - .081\ \text{qrt} - 0.598\ \text{p1} + 0.360\ \text{p2} - 0.562\ \text{p4} \quad \text{(Eq. 1)},$$

accounts for 87.8 per cent of the variation in the utilization rates. Figure B compares the plots of the regression estimates with the observed rates shown in Figure 1 (in Griffith and Baloff). It is seen that the variation in the seasonal composition of the population produced a pattern of bumps which closely fits the observed pattern.

The large variation in the number of quarterly enrollments during the period of 1973–1977 seen in Table A produced the large variation in the seasonal mix of the population by duration of membership. PGPs that enroll approximately equal numbers of members each calendar quarter would be expected to have approximately uniform seasonal distributions except for large durations within a year of the maximum duration defined by the length of the study period.

Even small seasonal differences in utilization, which are acknowledged by the authors, can produce periodic variation in the utilization rates by duration of membership when there is wide variation in the seasonal mix of the population by duration of membership.

Discussion of national policy and HMO administrative implications of the relationship between membership duration and utilization should be based on sound examination of the underlying phenomenon.

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Commentary on "Membership Duration and Utilization Rates in a Prepaid Group Practice," by Mary Jane Griffith and Nicholas Baloff

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GRIFFITH AND BALOFF'S study of the effect of duration of membership on the use of physician services‡ in a prepaid group practice (PGP) further supports the hypothesis that per capita utilization declines from its initial high level and stabilizes thereafter. Their study examines the effects of income, education and race, variables that have been ignored by previous research in the area. Furthermore, the generalizability of the research appears to be substantial, in that the Medical Care Group (MCG) mirrors many of the characteristics of PGPs in this country.

These important findings notwithstanding, Griffith and Baloff's study does have two major difficulties. The first is that the authors have assumed that the MCG provided a "stable" research environment during the time of the study. The second is the adequacy of the time trend analysis within subpopulations.

Research Environment

Organizations are not static—changes take place over time, and, in our opinion, PGPs and their membership are no exception. Many of these changes directly affect the use of medical services and, thus, could potentially confound the study of the effect of duration of membership. Some of the more important potential correlates of utilization that might change over time are:

1. Need for medical services;
2. Health education levels of enrollees;
3. Provider availability and accessibility;
4. Use of ancillary personnel;
5. Provider mix;
6. Amount and types of benefits available to plan members;
7. Training, competence and experience of providers; and
8. Use of deductibles, copayments and coinsurance.[1-3]

It is difficult to imagine that the MCG or any PGP did not experience some significant fluctuation in the above variables over a 5-year period. However, Griffith and Baloff have assumed exactly that and in

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‡ This also includes visits to paraprofessionals.

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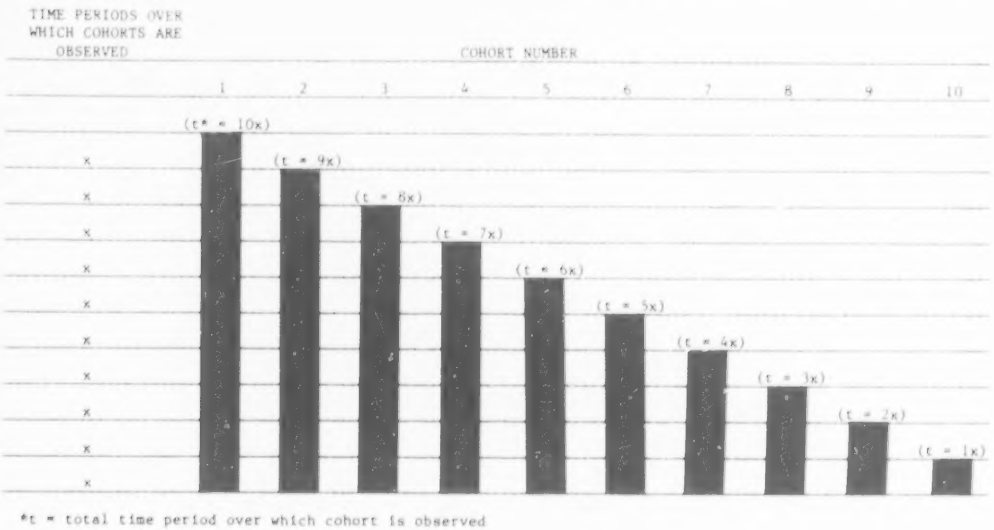

FIG. 1.

effect have attributed most of the changes in utilization time trends to duration of membership. One exception is the periodic "bumps" in utilization observed by the authors approximately every fourth quarter. Such systematic fluctuations in observations over time are consistent with what time trend analysts consider seasonal fluctuations. The authors state, however, that "seasonal influences are minor . . . (and) we have not adjusted our data for seasonality or any other temporal factors." This is confusing, considering the attention that the authors have shown these bumps, and considering the availability of accepted techniques (to be discussed below) to adjust for seasonal variations in time trends. Economists have employed such techniques for years when analyzing inflation and employment data. What is of even greater concern to this author is the potential number of nonsystematic changes in the MCG whose effects on utilization were not easily identifiable through Griffith and Baloff's graphic analysis. Moreover, any such shifts in utilization trends were likely explained as the effects of duration of membership.

In a study of the effect of duration of membership at the Columbia Medical Plan (CMP), a research method that was effective in identifying and controlling potentially confounding variables was identified.[4] This method involved multiple longitudinal cohort analysis (Fig. 1) and multiple dummy variable regression. In this illustration 10 cohorts were designated, and each was observed for a different length of time. Of course, any number of cohorts can be used, but it is desirable that the number of time periods be at least as great as the total number of cohorts.

The design in Figure 1 provides 10 observations on utilization of services during the first year of contact with the group, nine observations on the second year of contact, and so on, to one observation on the 10th year of contact (for cohort 1).

This multiple-cohort design permits one cohort to serve as a comparison for other cohorts, and it also helps to identify and differentiate any effects on utilization of

TABLE 1. PVs/Member/Quarter Year (Annualized Quarterly Rates) by Duration of Membership and by Cohort

Duration of Membership (quarters)	Cohort									
	1	2	3	4	5	6	7	8	9	10
1	4.70	5.53	7.48	4.91	5.97	4.36	4.30	5.08	5.33	4.86
2	5.36	5.35	6.95	7.23	8.27	6.44	6.23	5.69	7.00	6.32
3	5.31	5.10	6.63	7.33	5.75	5.22	7.57	6.72	6.52	5.28
4	5.17	4.95	6.70	6.45	5.55	5.08	7.20	6.56	5.60	6.89
5	5.59	5.08	6.14	5.20	5.49	5.34	6.66	4.80	7.33	
6	5.35	5.01	5.59	6.18	6.28	5.58	5.10	6.56		
7	4.98	4.67	6.51	6.39	7.32	5.12	6.39			
8	4.90	4.86	7.11	6.19	5.00	6.18				
9	4.92	5.55	6.62	4.58	6.47					
10	5.26	5.41	5.26	5.79						
11	5.32	4.72	5.22							
12	4.79	5.54								
13	5.62									

services associated with a specific study quarter (e.g., summer or winter) from those associated with duration of enrollment in the group. On the other hand, if a single-cohort design is employed as in Griffith and Baloff's study, events associated with chronological time of enrollment are held synonymous with the effects of duration of membership.

There are a number of changes that took place over time in CMP that might have confounded the effects of duration of membership on the use of services. Those changes that were of special concern in our prepaid group practice study were provider/enrollee ratio, provider mix, available office hours and need for medical care.

Seasonal fluctuation in need for care is used as an example here. In Table 1 we list the provider visits (PVs) per member per quarter for each cohort by duration of

TABLE 2. PVs/Member/Quarter Year (Annualized Quarterly Rates) by Study Quarter and by Cohort

Study Quarter	Cohort									
	1	2	3	4	5	6	7	8	9	10
1	4.70									
2	5.36	5.53								
3	5.31	5.35	7.48							
4*	5.17	5.10	6.95	4.91						
5	5.59	4.95	6.63	7.23	5.97					
6	5.35	5.08	6.70	7.33	8.27	4.36				
7	4.98	5.01	6.14	6.45	5.75	6.44	4.30			
8*	4.90	4.67	5.59	5.20	5.55	5.22	6.23	5.08		
9	4.92	4.86	6.51	6.18	5.49	5.08	7.57	5.69	5.33	
10	5.26	5.55	7.11	6.39	6.28	5.34	7.20	6.72	7.00	4.86
11	5.32	5.41	6.62	6.19	7.32	5.58	6.66	6.56	6.52	6.32
12*	4.79	4.72	5.26	4.58	5.00	5.12	5.10	4.80	5.60	5.28
13	5.62	5.54	5.22	5.79	6.47	6.18	6.39	6.56	7.33	6.89

* Quarter year period covering the months of July, August and September.

membership. No seasonal effects are obvious. However, a rearrangement of the data according to *study quarter* (as opposed to duration of membership) produces different results (Table 2). The data for study quarters 4, 8 and 12 all of which included the months July, August and September, show generally lower utilization rates than either the preceding or subsequent study quarters. This can probably be attributed to less need or demand for care, especially care related to upper respiratory illness, as well as to the number of providers and enrollees out of the area on summer vacation. As stated previously, Griffith and Baloff's data resemble the seasonal patterns presented here, but there is no way of knowing whether these configurations are seasonal effects or are explained by duration of enrollment.

Another example is shown in data on walk-ins§ per 100 members per quarter year. In Table 3 there is no apparent correlation between duration of membership and walk-ins, with the exception of the last two quarters of membership in each cohort. In these quarters a dramatic increase in walk-ins is noted. The probable cause of this increase is made clearer by displaying the rate of walk-ins by study quarter (see Table 4). It now appears that this increase is not associated with duration of membership, but rather that it is associated with the last two quarter years of the study.

At the start of the 12th study quarter, the CMP opened its own hospital, which was the first for the city in which the plan is located. Until this time, plan members had to drive at least 15 miles to reach a hospital emergency room. With the opening of the new emergency room, medical care was made more accessible, resulting in an increase in emergency room visits, the majority of which were classified as walk-ins. It appears that it was the opening of the hospital and not duration of membership that resulted in the large increase in walk-ins during study quarters 12 and 13.

The mere identification of confounding factors is not always sufficient, however. Thus, we will discuss next dummy variable regression, a procedure for adjusting utilization data to control confounding variables.

§ PVs that were not arranged in advance in any way.

TABLE 3. Walk-Ins/100 Members/Quarter Year (Annualized Quarterly Rates) by Duration of Membership in the CMP and by Cohort

Duration of Membership in the Plan (quarters)	Cohort									
	1	2	3	4	5	6	7	8	9	10
1	18.28	33.25	44.52	29.29	29.07	18.76	29.89	42.58	25.88	34.04
2	25.55	28.10	34.18	26.71	30.62	30.70	47.02	32.03	40.51	39.39
3	29.96	28.60	27.85	23.90	21.05	32.78	55.63	23.49	53.16	88.34
4	31.72	22.11	30.38	24.60	39.23	30.29	27.81	33.45	71.73	74.95
5	18.50	21.28	30.38	35.15	23.92	27.38	37.75	63.34	83.54	
6	22.91	27.10	36.71	34.45	23.92	39.83	65.56	55.52		
7	20.26	26.60	39.24	32.34	31.58	68.05	70.86			
8	29.07	26.77	30.38	34.45	56.46	64.73				
9	32.60	30.92	45.57	59.75	66.03					
10	28.19	27.43	78.48	74.52						
11	27.31	56.69	56.96							
12	56.39	62.18								
13	60.79									

TABLE 4. Walk-Ins/100 Members/Quarter Year (Annualized Quarterly Rates) by Study Quarter and Cohort

Study Quarter	Cohort									
	1	2	3	4	5	6	7	8	9	10
1	18.28									
2	25.55	33.25								
3	29.96	28.10	44.54							
4	31.72	28.60	34.18	29.29						
5	18.50	22.11	27.85	26.71	29.07					
6	22.91	21.28	30.38	23.90	30.62	18.76				
7	20.26	27.10	30.38	24.60	21.05	30.70	29.80			
8	29.02	26.60	36.71	35.15	39.23	32.78	17.02	42.58		
9	32.60	26.77	39.24	34.45	23.92	30.29	55.63	32.03	25.88	
10	28.19	30.92	30.38	32.34	23.92	27.38	27.81	23.49	40.51	34.04
11	27.31	27.43	45.57	34.45	31.58	39.83	37.75	33.45	53.16	39.39
12	56.39	56.69	78.48	59.75	56.46	68.05	65.56	63.31	71.73	88.34
13	60.79	62.18	56.96	74.52	66.03	64.74	70.86	55.52	83.54	74.94

Dummy variable regression is a simple and useful method that uses binary independent variables to incorporate categorical information such as season, study quarter and sex into a regression equation. It can also be used to adjust data for the effects of such variables. Although the technique is not new, it is usually not discussed in elementary text books on statistical methods. In our research the 13 quarter years of the study were entered into the regression equation as study quarters. A regression coefficient was then determined for each study quarter. This coefficient estimated the impact of that study quarter on the dependent variable. This technique has been proposed before by Price,[3] but the study-quarter effect is usually called the period effect and the duration-of-membership effect is usually

TABLE 5. Regression Coefficients for Provider Visits Per Member Per Quarter Year by Study Quarter

Study Quarter	Coefficient	F	Proportion of Sample	Adjusted Coefficient (Coefficient + Q)
C	5.054			4.251
a_2	−2.752	15.811	0.013	−1.949
a_3	−1.925	7.955	0.013	−1.122
a_4	−1.872	13.155	0.026	−1.069
a_5	−1.378	9.676	0.039	−0.575
a_6	−0.935	5.492	0.053	−0.132
a_7	−0.405	1.214	0.066	+0.398
a_8	−1.073	9.724	0.079	−0.270
a_9	−1.447	19.831	0.092	−0.644
a_{10}	−0.913	8.723	0.105	−0.110
a_{11}	−0.301	1.032	0.118	+0.502
a_{12}	−0.284	0.992	0.132	+0.519
a_{13}	−1.342	22.959	0.132	−0.539
	0		0.132	+0.803

Q = .803

called the age effect. The data on PVs/member/quarter year in Table 1 are observations on the dependent variable Y; the independent variables are dummy variables representing the study quarters S_i, i = 1, . . . , 13. We omitted S_{13} from the equation and estimated the coefficients c and a_i, i = 1, . . . , 12 for the regression equation.

$$Y = c + a_1 S_1 + \ldots + a_{12} S_{12} + e,$$

where e as usual e is a random error component. The coefficients and their F values are given in Table 5. The adjusted coefficients are found by solving the equation

$$\sum_{i=1}^{13} P_i (a_i + Q) = 0$$

for Q; the a_i are the original coefficients, the P_i are the corresponding proportions in the sample and Q is the adjusting constant used to calculate the adjusted coefficients incorporating the effect of S_{13}. This is the procedure suggested by Sweeney and Ulveling.[6] The adjusted coefficients are then used to adjust the PV data for the effects of confounding variables that occur in the study quarters. The adjusted PV utilization data are then analyzed to determine the relationship between utilization of services and duration of membership free of the spurious effects of confounding variables in the study quarters.

Regarding this method, one could question the use of a cohort analysis when the adjustments for confounding effects on utilization of services could be dealt with by the dummy variable regression alone. It is true that the adjustments to the dependent variable (i.e., use of services) could be made without the multiple-cohort analysis, but the researcher would have difficulty in determining the purpose for which the adjustments were being made. It should be noted that use of the "cohort" component of the design does not guarantee identification of all confounding variables. However, with sufficient supplementary data, such as manpower and total number of enrollees, a number of important influences on utilization of services can be brought to light. Furthermore, the researcher should develop, wherever possible, the theoretical constructs behind significant statistical associations and should not just adjust data "in the dark."

Time Trend Analysis

In their study Griffith and Baloff spend considerable time describing differences in time trends within subpopulations (e.g., the utilization patterns of males vs. females over time), especially differences in the duration of the "start-up" effect. These differences appear often, in our opinion, to be in the eye of the beholder or, in cases where a concensus of viewers may be achieved, the differences could be attributed solely to random variation. Since no tests of statistical significance are performed, the reader is left to fend for himself or herself. There are statistical models and corresponding computer programs available, however, that may be appropriate for these data.[4-7] We used the exponential decay curve model in our study at the CMP, and it appears that this model would apply to Griffith and Baloff's data as well. The equation for the exponential decay curve is:

$$y = c + ae^{-bx} + \epsilon,$$

where y = dependent variable; c = constant to be estimated (this represents the level to which the curve is asymptotic); a = constant to be estimated (y = c + a + e when x = 0); e = base of the natural system of logarithms (2.718); b = decay constant; and ϵ = residual error.

There are no closed-form solutions for the estimator of the parameters c, a and b as there are for the parameters in a linear regression equation. A computer program is used to obtain the least squares estimates

of the parameters by an iterative technique, i.e., values of c, a and b were found that minimized $\Sigma[y_i - (c + ae^{b,c}\ i)]^2$.

This model enables the researcher to differentiate statistically curvilinear time trends among subgroups. In addition, the model allows the health administrator or planner to estimate more accurately the point of stabilization of utilization (i.e., the asymptote) than could be achieved by the visual inspection method offered by Griffith and Baloff.

References

1. Aday L, Eichhorn R. Utilization of health services: indices and correlates. National Center for Health Services Research, DHEW, 1973.

2. Donabedian A. Benefits in medical care programs. Cambridge: Harvard University Press, 1976.

3. Donabedian A. Aspects of medical care administration. Cambridge: Harvard University Press, 1973.

4. Yesalis C, Bonnet P. The effect of duration of membership in a prepaid group health plan on the utilization of services. Med Care 1976;14:1024.

5. Price D. A respecification of variables in cohort analysis. Presented at the Annual Meeting of the American Statistical Association, Boston, Mass., August 1976.

6. Sweeney R, Ulveling E. A transformation for simplifying the interpretation of coefficients of binary variables in regression analysis. American Statistician 1972;26:30.

7. Horn S, Yesalis C, Bartels R. Selection of regression models for health care data. Med Care 1978; 16:574.

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Reply to Comments: "Membership Duration and Utilization Rates in a Prepaid Group Practice"

NICHOLAS BALOFF, PH.D., AND MARY JANE GRIFFITH, PH.D.

OUR REACTION to the two commentaries and to the guest editorial is decidedly mixed. On one hand, we are pleased by the extra attention that the start-up effect is receiving. On the other hand, we are disappointed by the focus and content of these remarks, for several reasons: 1) Our primary findings about start-ups and their implications have been largely ignored; 2) The authors of the commentaries have failed to respond to important criticisms of their own papers that were published earlier in this journal[1,2]; 3) Instead of dealing with either of these problems, the commentaries dwell upon methodologic criticisms of secondary issues; and 4) As a result, one receives the mistaken impression that our paper was the first in a sequence (rather than the third) and that the role of the commentaries was to critique our methodology.

A review of the past sequence of events will hopefully set the matter straight. In a paper published in this journal in 1976,[1] Yesalis and Bonnet reported evidence of a substantial start-up effect. In a second paper, published in this journal in 1979,[2] Mullooly and Freeborn disputed that finding, considering the start-up effect merely an artifact of the methodologic adjustments made by Yesalis and Bonnet. In addition, based on their own analysis of different data, Mullooly and Freeborn reported finding *no* start-up effect. Our review and reanalysis of the Mullooly and Freeborn paper indicated that their general conclusion seemed to be at odds with their own data, since four separate age–sex subgroups of the population appeared to have experienced a substantial start-up similiar to those found in our study. This apparent contradiction seems to have resulted from their methodologic decision to average the utilization data of different age–sex subgroups that had quite different utilization trends over time (some decreasing, others increasing) to yield an "average curve" for the entire population that may not have described any of the subgroups of which it was composed.

These contradictory findings and the questionable methodologic techniques upon which they were based greatly influenced our choice of objectives and methods; specifically, it seemed appropriate for us to return to the basic questions of the existence of the start-up phenomenon, its elementary characteristics and its generality across different subgroups of our study population. To avoid compromising the findings through analytic and methodologic manipulations, we chose the simplest, most descriptive forms of analysis, disclosed our data fully and avoided the types of data adjustments that had confused past results. With this background, the specific criticisms contained in the commentaries can be evaluated in proper context.

Mullooly Commentary

In his commentary, Mullooly argues several different points, including calendar quarter methodology, "selection bias" related to nonrespondents and disenrollees, duration of the start-up and seasonal-

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ity (as a potential cause of the periodic bumps in the start-up data). Judging from the space devoted to them, his two main concerns are start-up duration and the bumps. We shall therefore consider these first.

With respect to start-up duration, Mullooly reconstitutes and reanalyzes our data for the start-up of the entire study population and asserts that: "It is seen that the apparent decline in provider rate is limited to the first eight quarters of membership and that the magnitude of the variability inherent in the utilization rates makes it inappropriate to attach importance to subsequent drops in rate." This assertion is incorrect on two counts. First, it is *not* supported by the evidence he presents, as we shall show below. But more importantly, he has completely ignored the compelling contrary evidence that is contained in the subgroup start-ups. This is the same error that he made in his earlier paper.[2] He has focused narrowly upon the total population and overlooked the results in the subgroup analyses. He therefore draws an erroneous conclusion that is contradicted by the subgroup results. To illustrate the point, perusal of the start-ups for males and females in Figure 2 of our paper will show that the start-up for males *continues rather clearly through quarter 16*. The start-up for females, on the other hand, seems to end after quarter 8. Combine the two, and the resulting trend naturally "flattens" and becomes harder to interpret. But is it sensible to argue, as does Mullooly, that the start-up has *ended* after quarter 8—given that the males' start-up clearly continues well beyond that? Similar evidence can be found in the start-ups for racial subgroups (Fig. 3). It appears that both of these start-ups also continue beyond quarter 8, though it is clearer for nonwhites than for whites. Much additional evidence of start-up duration well beyond quarter 8 is contained in the other subgroup analyses. The key point, however, is the importance of looking beyond the aggregated, total population curve to the subgroup start-ups in drawing conclusions about the duration (or other characteristics) of the start-up phenomenon. It is also essential that we analyze subgroup start-ups to gain a better understanding of the phenomenon and its causes. It is, for example, important to acknowledge the different durations of start-ups between males and females if we wish to explore the causal mechanisms underlying them. It is also important for planners and administrators interested in practical applications to consider the different durations and other characteristics of start-ups between sexes (and races, etc.) in order to make appropriate estimates of start-ups for different populations—composed of different subgroups in varying proportions.

Even if, for the purposes of argument, one grants Mullooly his narrow focus on the total population curve, the evidence he presents fails to support his assertion. Based upon an assumed standard deviation (which is incorrectly held constant over time) and a reconstituted population of respondents and nonrespondents, he develops a figure showing mean utilization rates with ever increasing confidence limits. That is all! He does not statistically test this result in any way. He simply asserts in a completely judgmental manner that the decline in utilization rates is limited to the first eight quarters. This is clearly not valid. The variability of the utilization rates *naturally* increases with decreases in sample size, making it harder to evaluate an underlying downward trend. The obvious disruptions of the bumps also contribute to this difficulty. But this certainly does not *prove* that the trend ends in quarter eight. In fact, one can readily marshall statistical evidence to the contrary, in the following way: To reduce some of the variability after quarter 8, we aggregated the quarterly data into yearly periods. Mean rates for the full year follow-

ing quarter 8 (quarters 9–12) and for the last year of the data (quarters 17–20) for both respondents and nonrespondents were found to be 4.570 and 4.148, with standard errors of 0.0678 and 0.1886, respectively. To determine whether these means and standard errors are consistent with continued reductions after quarter 8, we treated the observations in the last four quarters (17–20) and in the four quarters following quarter 8 (9–12) as independent (as a first approximation) and calculated the difference between the means for these periods, and then divided this by the estimated standard error of the difference, obtaining a value of 2.1074. This is statistically significant at the 0.05 level. Based upon this test, it appears that the reductions in utilization rates did indeed continue beyond quarter 8.

To summarize, Mullooly's assertion is not supported by his own argument. It is clearly contradicted by the subgroup results that he has ignored and by our statistical test results.

As his second point, Mullooly seeks to demonstrate that the periodic bumps in our start-ups may have been caused by seasonal variation in utilization. He alleges that "An alternative explanation supported by their data is that this periodic variation is attributable to seasonal variation in utilization." This allegation is incorrect. We shall again demonstrate this both in reference to important flaws in his argument and through direct refutation with our own results.

Mullooly's lengthy analysis may appear impressive on first reading. Closer examination, however, shows it to be essentially self-evident and inconclusive. His regression results are the problem. Mullooly claims an impressively large coefficient of determination (r^2) and then uses his regression equation to produce a new start-up plot that parallels our original graph, including the bumps. On this result alone he rests his case. The difficulty is that the result is really a *tautology:* the large coefficient of determination was *virtually guaranteed* because of the number and type of independent variables he used, and it therefore demonstrates little or nothing by itself. By then taking this self-evident result and calculating values for a new plot with bumps, he has done nothing more than give us a graphic illustration of the tautology. Speaking technically, the p_i variables in his equation are cyclic, with periods of four quarters and four different phases. It is obvious that any cyclic wave form of period 4, like the bumps in the start-ups, would be very well fitted with any three of these variables and an intercept. By adding his duration variables (qrt), the downward trend is also well fitted. Hence, an impressively large r^2 is almost certain to result.

It is puzzling that Mullooly has neglected to tell us more about his regression results. For example, in addition to the total r^2, we are very interested in the *partial* explanations offered by the different independent variables—especially the main variable of *duration* of membership. Could it be that duration explained most of the variation, and the seasonality variables very little? If so, it would of course argue *against* Mullooly's allegation. It could also contradict his earlier assertion that the duration of the start-up was only eight quarters.

We turn now to our own evidence in order to refute Mullooly's allegation. Remember that we clearly stated in our paper that seasonal influences were minor in the start-ups. The analysis presented in Figure A shows why we made that statement and should erase any lingering doubts on the subject. The utilization rates shown there have been weighted in such a way as to control for (or cancel) any seasonality effect.* Hence, if seasonality were the cause,

* We separated our population into four groups of individuals by the calendar quarter in which they

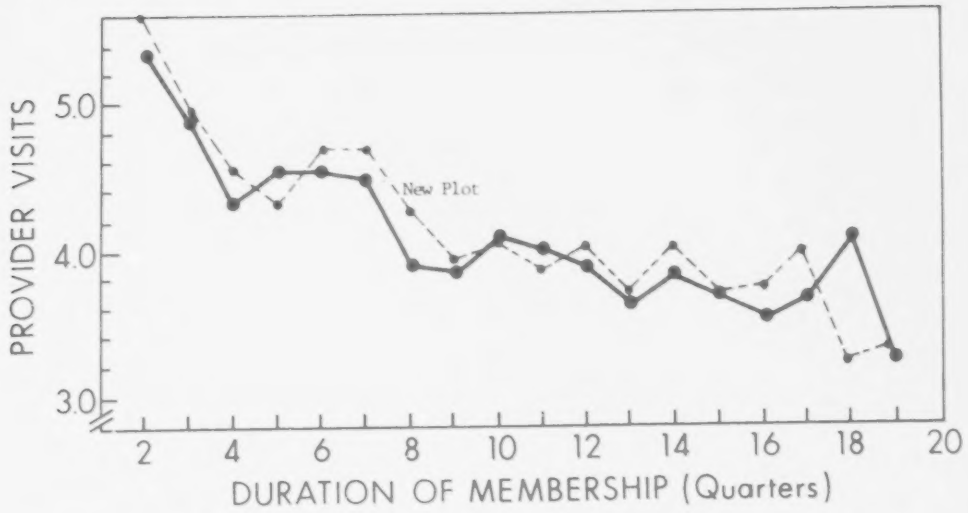

FIG. A. Utilization rate of enrollee versus membership duration.

no bumps would have appeared in the figure. As can be clearly seen, the bumps not only remain, they are still sizable, and their distribution over time is approximately the same as before.

To summarize, the second of Mullooly's two major points is not supported by his own results—and it is clearly refuted by our analysis.

We turn now to the remaining points in his commentary. Specifically, his comments about "calendar quarter" methodology—which he employed in his paper[2]—are *not* responsive to the criticisms of this approach contained in our paper. His detailed comments about "person-months of membership" are irrelevant to our primary criticism of his approach, as well as being incorrect (assuming an average membership of two months to adjust first-quarter rates is wrong). Next, the comments on "selection bias" fail to recognize key points made in our paper, as follows: 1) Nonrespondents were excluded from our analyses because SES data were not available for them. Including them would therefore have made it impossible to evaluate the start-ups for the different subgroups—which could lead to the types of erroneous conclusions that Mullooly has made in his paper and commentary. 2) However, as stated in our paper, we analyzed the start-up curve for the nonrespondents *separately* and found that it closely parallels that of the respondents. 3) Regarding disenrollment, Mullooly's concerns should be placed in the context of the very low 2–3% per year disenrollment rate that existed over the five-year study period. It seems unreasonable to claim that excluding such a small number of persons could have materially changed the start-ups—particularly given their large magnitude and consistency across subgroups.

Yesalis and Horn Commentary

In the second commentary, Yesalis and Horn argue three points: 1) We should have adjusted for seasonality and for vari-

enrolled (winter, spring, etc.), calculated mean utilization rates for each group for each quarter of membership, then averaged these to give equal representation to each group in the calculation of the seasonally adjusted mean utilization rates shown in the figure. This has the effect of cancelling seasonal effects by adjusting for different numbers of persons who enrolled in different seasons.

ous changes in the plan (provider-to-enrollee ratio, provider mix, available office hours, etc.); 2) We should have used their methodology of so-called "multiple cohorts" to compose the population for analysis rather than the so-called "single cohorts"; and 3) We should have employed statistical models to analyze our data and to determine the duration of the start-up effect. We shall discuss these three points in turn.

There are several reasons for rejecting the first point. The clearest and most compelling of these reasons is that the adjustments they are advocating so strongly are precisely those used by Yesalis and Bonnet in their 1976 paper and validly criticized by Mullooly and Freeborn[2] *for artificially producing a start-up trend* where none was evident in the raw utilization data for several of the cohort groups. This criticism is a powerful one, for it makes it seem that the start-ups reported by Yesalis and Bonnet were simply methodologic *artifacts* of their "adjustments"—the very same adjustments that Yesalis and Horn are now recommending to us. Furthermore, neither Yesalis and Bonnet (in their original article) nor Yesalis and Horn (in their commentary) have really examined this criticism, or explained how their "adjustments" could have produced such curious and troubling results. They have also not provided enough explication of these procedures to enable readers to reconstruct the details of the adjustment process and determine for themselves which adjustments created the problems, and how.

We are thus left with considerable uncertainty over both the validity of the original results and the credibility of the adjustment methods used to arrive at them. It seems completely inappropriate, therefore, to urge application of these same adjustment techniques to our study. On the contrary, the problems associated with them are partially responsible for our insistence on using simpler analyses to establish the credibility of the start-up effect and its "unadjusted" characteristics.

The second reason for rejecting their suggestion is the absence of a comprehensive theoretic basis for making such adjustments. Although it may *seem* that the variety of the plan changes cited by Yesalis and Horn could affect utilization behavior and rates, such presumptions are not adequate grounds for making multiple, interrelated adjustments to data—especially when the adjustments change the raw data so appreciably.

We turn now to their second issue relating to "multiple-cohort" versus "single-cohort" designs. Since Yesalis and Bonnet used the multiple-cohort design *exclusively* in their earlier paper,[1] it is not surprising that now Yesalis and Horn extol its benefits. What is very surprising—even baffling—is that they criticize us for using the single cohort instead of their multiple-cohort approach. It appears either that they have not read our paper completely, or that they did not comprehend it fully. We have specifically included *the very same* multiple-cohort approach they recommend, in addition to the single-cohort method. Figure 8 in our paper shows the start-ups for three cohorts of individuals that are defined *identically* to their "multiple cohorts." Furthermore, Figure 7 shows two additional start-ups of cohorts defined by employer group; these approximate the "multiple-cohort" definition closely because most of the individuals in these cohorts joined at the same time. It is unfortunate that Yesalis and Horn have overlooked these findings, because they show directly that their concerns about our analyses are groundless. Perusal of Figures 7 and 8 will reveal that these start-ups have the same basic characteristics as seen in all the other plots using the "single-cohort" design. All five document large changes in utilization over long durations. Furthermore, the basic trends seem to resemble closely the other start-

ups, and the evidence of underlying bumps is reasonably clear in most of them. These results provide considerable assurance that our "single-cohort" start-ups were not, as Yesalis and Horn criticized, affected by major changes in the plan or seasonal influences. In addition, although it is not as obvious, the stability of the single-cohort start-up characteristics across so many different recompositions of our population by SES subgroups also lends assurance on this point.

Given this evidence, Yesalis and Horn's criticism seems quite inappropriate and reflects a lack of comprehension of our results that is rather troubling under the circumstances. Furthermore, in their strong commitment to their own method, they have neglected to recognize the methodologic and practical benefits of the other method—and hence fail to realize the importance of employing *both* methods simultaneously as we have done in our study.

As their third point, Yesalis and Horn suggest the use of statistical models to analyze our data. They note the utility of regression analysis as a means of statistical testing, then remark on its usefulness in allowing administrators to estimate more accurately the point of stabilization of utilization at the end of a start-up. As we stated in our paper and reiterated at the beginning of this reply, both of these suggestions are basically inconsistent with the stated objectives and methodologic approach of the *present* paper. However, given the results of the present paper and the resulting clarification of the basic issues, regression analysis and start-up modeling are reasonable next steps. We have performed such analyses, and interested readers can find these results and their practical applications to many administrative functions discussed elsewhere.†

† See: Baloff N, Griffith MJ. Managing Startup Utilization in Ambulatory Care. Journal of Ambulatory Care Management (forthcoming). February 1982.

We began this reply by noting that both of the commentaries had ignored our major findings and the important criticisms of their own previous work, and instead had focused on narrow methodologic criticisms of secondary issues. We have since shown that their specific criticisms are largely incorrect or unsupported. We have also noted how both commentators seem to have revisited their own past errors—returning to the methodologies and analytic approaches that created problems in their original papers. This is unfortunate. We would all have been better served by a thoughtful consideration of the criticisms and a reanalysis of their past results and conclusions. This could have yielded a better understanding of the generality of start-ups across settings, how their characteristics may be modified by specific institutional factors and a number of other questions suggested in our paper.

Perrin Editorial

Perrin's editorial seems misdirected. He has applauded the two commentaries for being part of a process of "exploratory data analysis," but failed to recognize the serious errors that destroy their utility for this purpose. His philosophical remarks are therefore poorly illustrated by the commentaries. Indeed, these comments are much better illustrations (when combined with the authors' earlier articles) of the unfortunate consequences of applying statistical techniques and data adjustments without a sound understanding of the underlying phenomena.

References

1. Yesalis CE, Bonnet PD. The effect of duration of memberships in a prepaid group health plan on the utilization of services. Med Care 1976;14:1024.

2. Mullooly JP, Freeborn DK. The effect of length of membership upon the utilization of ambulatory care services: A comparison of disadvantaged and general membership populations in a prepaid group practice. Med Care 1979;17:922.

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An Organized Locum Tenens Service and the Cost of Free Time for Rural Physicians

ALAN K. KRONHAUS, M.D.

Dissatisfaction with the conditions of rural practice perpetuates the geographic maldistribution of physicians. This study evaluates the economic productivity of physicians who participated in an organized locum tenens (LT) service that was designed to improve practice conditions for rural physicians by making time off more feasible and less costly. The productivity of LT physicians, expressed as their average daily billing, was compared with the amount charged to rural clinics for the LT service and with the revenue billed by the clinic physicians during the same month. The clinics were charged $375/regular working day for the LT service. LT physicians billed an average of $439/day, compared with $584/day billed by the clinic physicians ($p < 0.01$). The revenue billed by 85 per cent of the LTs exceeded the amount charged for their services; the revenue billed during 80 per cent of the coverage episodes also exceeded the $375/day level. When LT billing was expressed as a percentage of clinic physician billing, LT productivity was found to be significantly higher in solo practices, as compared with partnership practices (97 per cent vs. 73 per cent, $p < 0.01$). Assuming that a physician's overhead remains constant when he leaves, the cost of leaving a practice with LT coverage was almost invariably less than the cost of leaving without coverage. This finding justifies cautious optimism about using LTs to increase free time and improve practice conditions for rural physicians.

GEOGRAPHIC DISPARITIES in the per capita distribution of physicians exist in nearly every country. These disparities exist in part because most physicians prefer to live and work in metropolitan communities.[1,2] Moreover, dissatisfaction with the conditions of rural practice helps to perpetuate geographic maldistribution.[3–6] Since community characteristics and physician preferences will not change much in the near future, strategies to increase the supply of rural physicians should include methods for improving the conditions of rural practice.[3–8]

The large body of research on health manpower distribution suggests a number of factors that correlate with or influence physician location.[8–19] For people interested in attracting physicians into rural areas, these studies help to characterize probable candidates and appropriate inducements for rural practice. But why bother recruiting physicians for rural communities if they find rural practice conditions unacceptable and soon decide to leave? If the goal is to fill the basin, it seems only sensible to plug the drain first.

To understand why physicians quit rural practice, studies could ask physicians who

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once worked in that setting why they left. In the only published study of this sort, Parker and Sorenson mailed a closed-ended questionnaire to physicians who had once worked in rural areas of upper New York State. The 49 respondents mentioned inadequate time away from the practice as one of the most important reasons for leaving their rural communities.[3]

Surveys of physicians who switch from primary care to specialty practice can supplement the scanty data pertaining strictly to rural practice. The reasons physicians leave primary care bear on the issue of rural manpower because primary care physicians provide most of the services in rural areas.

From an open-ended questionnaire mailed to Virginia physicians who changed from primary care to specialty practice, Crawford and McCormack concluded that among their 73 respondents, "long hours" and the "strain of constantly feeling unable to get away" were the major reasons for dropping primary care practice.[4] Their conclusion was supported by the fact that 85 per cent of the physicians reported taking two weeks or less of vacation per year, which compares unfavorably with the national average of nearly five weeks of vacation per year for primary care physicians.[20]

In a series of personal interviews, Harvey asked 109 general practitioners in Canada why they thought physicians left general practice, and 74 physicians who had switched from general to specialty practice why they had changed. Both groups believed that "long hours" and "insufficient autonomy over one's time" were the most important factors influencing attrition in general practice.[5]

Attitudes and opinions do not establish cause and effect relationships, and all physicians do not react in the same way to the same conditions of practice. Nevertheless, three studies using very different methods strongly suggest that insufficient time off is a problem likely to evoke widespread dissatisfaction among physicians in rural practice and to aggravate attrition in rural areas.

Physicians could increase their free time in various ways. By giving patients adequate notice, they might simply take more time away from the practice. But many physicians hesitate to leave their practice without some type of coverage. Conversely, lack of suitable coverage might deter physicians from taking more time off. Group practice has been widely touted as a means to improve the conditions of rural practice, in part because a group can offer readily available coverage and more regular working hours to its members.[8, 19]

The population of many rural communities, however, is not sufficient to support a group practice, or even another physician. Some physicians avoid making coverage arrangements with local colleagues because they fear losing patients, their standards of care do not coincide or they shun the added responsibility of providing coverage in return.

An organized service that provides locum tenens coverage in rural areas could benefit physicians and their patients in many ways. By helping physicians circumvent coverage problems, such an arrangement might increase their free time while improving continuity of care, maintaining practice productivity and assuring patient satisfaction during an absence. However, if physicians believe that locum tenens coverage would increase the expense of leaving their practice, economic concerns might overshadow other considerations. This study was undertaken to evaluate the economic productivity of locum tenens physicians in rural clinics and to compare the cost of leaving a practice with and without locum tenens coverage.

Setting

The data for this study were provided by Health Systems Research Institute (HSRI),

a private corporation whose primary objective was to establish and operate medical clinics in manpower-shortage areas of the western United States. Medically underserved communities contracted with HSRI to recruit physicians who would make a long-term commitment to the community and its clinic. These physicians will be referred to as clinic physicians (CPs).

HSRI's strategy for recruiting and retaining clinic physicians was to provide them with a package of support services designed to improve the conditions of practice in their community. One element of this package was guaranteed time off with coverage. To provide the coverage, HSRI organized and deployed a group of locum tenens physicians (LTs). Some of these physicians entered into an exclusive agreement to do locum tenens work for HSRI and will be referred to as full-time locum tenens (F-LTs). The demand for coverage often exceeded the capacity of the F-LTs to provide the service. To obtain additional coverage, HSRI contracted with physicians who did locum tenens work only occasionally, perhaps during vacation from a training program or their own practice. These LTs will be referred to as part-time locum tenens (P-LTs).

Although some physicians in the study had specialty skills, they all functioned as generalists, and all did at least some obstetrics. Three CPs did a small amount of major surgery. Physician income was based on two different methods of compensation. CPs were guaranteed a minimum income, but could earn somewhat more by increasing their productivity. LTs were paid a fixed amount for each week of coverage, regardless of productivity.

The clinics were operated by HSRI and were required to maintain detailed w k records for every physician. HSRI also provided coverage to clinics it did not operate, but these clinics were not included in the study because they did not send physician work records to HSRI.

The clinics did a minimum, if any, of their own laboratory or x-ray work; so the revenue generated represents billings for professional services. The clinics were located in communities that had populations of approximately 3,000–8,000 people and very small hospitals. Driving time to the next community with similar or more sophisticated services averaged 30–70 minutes under good conditions.

HSRI charged clinics a flat rate of $375/day for coverage. According to HSRI officials, the $375/day charge was enough to defray the direct (LT compensation and expenses) and the indirect (a realistic share of corporate overhead) costs of providing the service and to yield a reasonable profit for the company. The revenue billed by LT physicians was collected by the clinics to offset the amount charged for the service.

Methods

Productivity was expressed as the average daily revenue billed by LTs and CPs. The study compares LT productivity with CP productivity, and with the $375/day charged by HSRI for its LT service. It also compares the cost of taking time off with and without LT coverage.

Between January 1976 and June 1977, HSRI required its clinics to submit monthly records of the revenue billed and days worked by every physician. The records from the six clinics receiving coverage (one solo clinic, representing the work of two consecutive physicians due to turnover during the study period, and five partnerships) were available for examination at HSRI's central administrative office. A physician's average daily billing was calculated by dividing the revenue he or she billed by the number of days worked during each month of the study.

The 18-month study period encompassed the work of 12 CPs and 20 LTs. The locum tenens group was evenly divided between full-time and part-time physi-

TABLE 1. Comparison of Productivity: Locum Tenens with Clinic Physicians (N = 35 Episodes of Coverage)

	No. of Physicians	Average Daily Billings ($)	p Value (t-test)
CPs	12	$584	< 0.05
LTs	20	$439	

cians (F-LTs and P-LTs), who together provided 279 days of coverage, divided into 35 episodes varying in length from 3 days to 4 weeks. F-LTs accounted for 13 episodes, or 120 days of coverage, and P-LTs for 22 episodes, or 159 days of coverage. This represents the complete record of LT activities in all HSRI clinics receiving coverage during the study period. For each episode of coverage, LT productivity was compared with CP productivity during the same month.

Results

CPs billed an average of $584/day, compared with an average of $439/day for LTs. The difference is financially meaningful and statistically significant at less than the 1 per cent level (Table 1).

Figure 1 shows the relationship between locum tenens and clinic physician productivity. The ordinate indicates LT productivity during all 35 episodes of coverage, and the abscissa indicates CP productivity during the same month. There is no statistically significant correlation between the productivity of LTs and the productivity of CPs in the same practice, at the same time of year ($r = 0.23$, $p > 0.10$).

The distribution of LT billing in relation to the amount charged for their service helps to answer the question of how much it costs to take time off with LT coverage. HSRI charged the clinics an average of $375/day for LT coverage. Episodes of coverage during which LTs billed less than $375/day fall within the stippled area

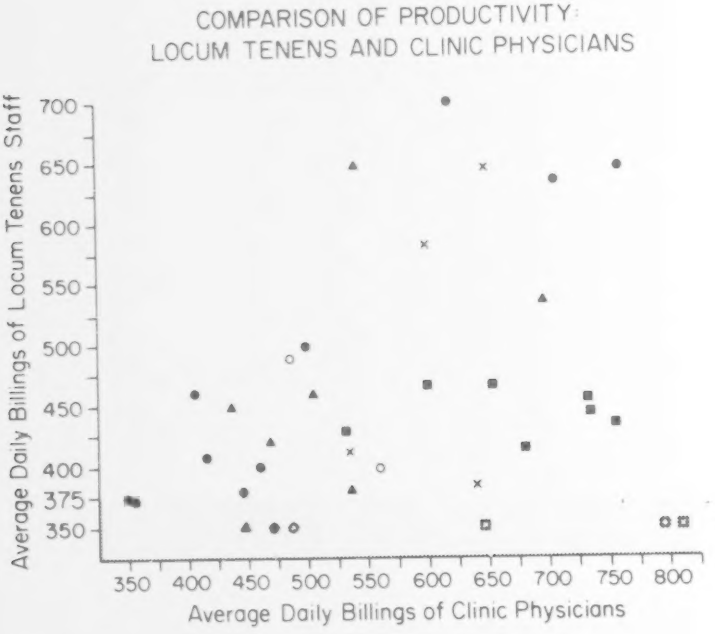

FIG. 1. Each point in the figure represents an episode of coverage. There are six different symbols, each representing one of the six clinics. The black circles represent the solo clinic. The stippled area designates episodes of coverage during which the locum tenens physician billed less than the amount charged for coverage.

TABLE 2. Comparison of Productivity Among Locum Tenens Physicians

	No. of Physicians	Episodes of Coverage	Average Daily Billings ($)	p Value (t-test)
Practice Experience				
< 10 years	7	11	$464	N.S.
> 10 years	13	24	$458	
Sex				
Male	18	30	$438	N.S.
Female	2	5	$468	
Length of Coverage				
< 2 wks.	10	11	$446	N.S.
2 wks.	15	24	$441	
Full-time vs. Part-time				
F-LT	10	21	$418	N.S.
P-LT	10	14	$479	

in Figure 1. LT billing during 28 of the 35 episodes (80 per cent) exceeded the amount charged for the service. From the perspective of individual physicians, as opposed to episodes of coverage, the average daily revenue billed by 17 of the 20 LTs (85 per cent) also exceeded $375/day.

Table 2 indicates the results of testing several independent variables for their effect on LT productivity. No statistically significant relationship was observed for practice experience, sex, duration of coverage or the LTs' status as full-time or part-time members of the group.

Another way to gauge the productivity of LTs is by their ability to maintain a CP's customary level of billing. When LT billing is expressed as a percentage of CP billing during the same month in each clinic, LT productivity was found to be significantly higher in solo than in partnership practices (97 per cent vs. 73 per cent, $p < 0.01$; see Table 3).

In order to compare the cost of leaving a practice with and without LT coverage, the assumption was made that practice overhead remains constant when the CP takes time off. If overhead stays the same, the cost of leaving the practice without coverage is approximately equal to the revenue forgone during the physician's absence. For CPs in this study, the average cost of leaving the practice without coverage would have been $584/day. By paying HSRI $375/day for LTs who billed $439/day, the clinics could realize a profit of $64/day from their investment in the service—if they collected the entire amount. On the average, LTs reduced the cost of an absence by 11 per cent, down to $520/day (see Table 4).

Discussion

An organized locum tenens service offers important advantages both to patients and to physicians unwilling or unable to arrange coverage locally. During an absence, the service could improve con-

Table 3. Comparison of Productivity: Locum Tenens in Solo and Partnership Practices

	Episodes of Coverage (N = 35)	% of CP Billing Achieved by LT	P Value (rank sum test of 35 episodes)
Solo	11	97	< 0.01
2-MD	24	73	

TABLE 4. Cost of Leaving with and without Coverage, in Dollars per Day

	Without Coverage	With Coverage		
Billing during absence ($)	None	439		
Revenue forgone during absence ($)	584	584	439	145
Direct cost of LT service ($)	None	375		
Net cost of absence ($)	584	145 + 375		520

tinuity of care, maintain practice productivity, prevent practice dissipation and assure patient satisfaction. If the service could increase free time for rural physicians and thereby improve the conditions of rural practice, it might eventually help to stabilize or increase the supply of rural manpower by making physician recruitment easier and retention more certain.

But will physicians be receptive to this locum tenens arrangement? The answer depends on both the quality of the service and the cost. This study demonstrates that it will most probably cost a physician less to leave his or her practice with LT coverage than without coverage. So from a strictly economic point of view, the LT arrangement should be well received.

The conclusion that the cost of leaving a practice with LT coverage is less than the cost of leaving without coverage is based on two assumptions: revenue forgone during absence approximates the revenue physicians would have produced had they been working during that period, and overhead costs do not change when physicians leave. If it were feasible and desirable, physicians could reduce the cost of absence in two ways. They could reduce revenue losses during absence by increasing patient care activity before or after they leave, or they could cut overhead costs by decreasing staff.

There are other factors that would weigh in a more thorough accounting of the financial impact of an LT service on a physician's practice. Preservation of a CP's hospital census, protection from patient attrition through competition during an absence and the fact that the LT service is tax deductible as a business expense are factors that would shift the accounting in favor of the LT arrangement. The revenue generated by laboratory and x-ray facilities, which were virtually absent from the study clinics, should increase the probability of an LT billing more than the amount charged for his or her service. On the other hand, a poor collection rate would hamper a physician's ability to recover the cost of the service.

In some respects, collected revenue might have been a better basis for determining how much the service cost a CP. There are problems with using that variable, however, especially in the comparisons of physician productivity. The nature of clinic accounting systems makes it virtually impossible to attribute collected revenues to a CP or LT, even in the solo practices, because patient accounts often add up over time, people make partial payments against their account balance, and so forth. Moreover, the collection rate was largely a function of HSRI's skills and aggressiveness in pursuing accounts, so that "collections" reflect activities other than physician productivity.

Half of HSRI's LT group was somewhat unique because they did full-time locum tenens work for HSRI. Their productivity, however, did not differ from the productivity of the part-time LTs who may be more representative of physicians likely to be engaged in locum tenens work. It would be interesting to compare the productivity of the LTs associated with HSRI with the productivity of physicians who do locum tenens on their own, or of physicians who do locum tenens for the American Medical Association's Project U.S.A. That program

relies on physicians, often semiretired, who occasionally provide locum tenens coverage to government-supported clinics.

It is no surprise that LTs billed less than CPs. Unless there were excess demand for physician services in the area, some patients would surely prefer to postpone a visit until their regular physician returned. This rescheduling would decrease LT utilization and productivity, with a reciprocal increase in CP productivity. The finding that LT productivity more closely matched CP productivity in solo than in partnership practices may also be due to in part to patient preference. In the partnerships, one CP had to remain in the practice when the partner left, so patients of the absent physician had a convenient and more familiar person they could choose in preference to the LT.

The difference between CP and LT productivity might also be explained in part by differences in the way they were compensated. LTs were paid a fixed amount for each week of coverage, regardless of productivity; CPs were guaranteed a salary, but could earn somewhat more by increasing their productivity. This difference, plus the fact that LTs worked for HSRI and not directly for the clinics, may have blunted their motivation to maintain the same productivity standards as the clinic physicians.

It is possible that LT productivity might have been higher in HSRI clinics than it would be in other rural practices. Patients might have visited the LTs more readily because HSRI communities were quite distant from the next available source of care. Clinic personnel can promote or discourage utilization of an LT. HSRI encouraged its employees to maintain normal scheduling during periods of coverage, a practice that would contribute to LT productivity.

Another factor that could have influenced LT productivity in HSRI communities is their long history of physician turnover. People inured to seeing different physicians might accept an LT more readily then people accustomed to seeing the same physician.

Many small, isolated communities have experienced longstanding difficulties in securing a physician. An organized LT service might offer these communities more stable health care by providing continuous physician coverage on a rotating basis. LT physicians could also provide seasonal coverage in national parks, resorts or other tourist areas.

This study suggests that rural physicians can benefit financially from locum tenens coverage. Future research could broaden the scope of this study to include specialties other than family practice and other important criteria for evaluating a locum tenens service. These criteria might include its effect on patient as well as physician satisfaction, the quality and continuity of care, physician attrition in rural areas and the cost of care to patients and society.

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References

1. Ginzberg E, Ostow M. Men, money, and medicine. New York: Columbia University Press, 1969:113.

2. Fuchs VR. Who shall live. New York: Basic Books, Inc., 1974:69.

3. Parker RC, Sorenson AA. The tides of rural physicians: the ebb and flow, or why physicians move out of and into small communities. Med Care 1978;16:152.

4. Crawford RL, McCormack RC. Reasons physicians leave primary practice. J Med Educ 1971;46:263.

5. Harvey EB. The vanishing practitioner. J Med Educ 1973;48:718.

6. Rakel RE. A better break for the rural physician. Prism 1973;1:56.

7. Kronhaus A. Rural practice reconsidered—a method of organizing health resources. Clin Med 1976;83:19.

8. Madison DL. Recruiting physicians for rural practice. Health Services Rep 1973;8:758.

9. Parker RC, Tuxill TG. The attitude of physicians toward small community practice. J Med Educ 1967;42:327.

10. Parker RC, Rix RA, Tuxill TG. Social, economic, and demographic factors affecting physician populations in upstate New York. NY State J Med 1969;69:706.

11. Taylor M, Dickman W, Kane R. Medical students' attitudes towards rural practice. J Med Educ 1973;48:885.

12. Martin ED, Moffat RE, Falter RT, Walker JD. Where graduates go: The University of Kansas School of Medicine—a study of the profile of 959 graduates and the factors which influenced their geographic distribution. J Kans Med Soc 1968;69:84.

13. Bible BL. Physicians' views of medical practice in nonmetropolitan communities. Public Health Rep 1970;85:11.

14. Cooper JK, Heald K, Samuels M, Coleman S. Rural or urban practice? (an analysis of factors influencing the primary care physician's practice location). Inquiry 1975;12:18.

15. Hassinger EW. Background and community orientation of rural physicians compared with metropolitan physicians in Missouri. Research Bulletin. University of Missouri, College of Agriculture, 1963;822.

16. Peterson GR. A comparison of selected professional and social characteristics of urban and rural physicians in Iowa. Health Care Research Series 8. University of Iowa, 1968.

17. Champion DJ, Olsen DB. Physician behavior in southern Appalachia: some recruitment factors. J Health Soc Behav 1971;12:245.

18. Eisenberg BS, Cantwell JR. Policies to influence the spacial distribution of physicians. Med Care 1976;14:455.

19. Evashwick CJ. The role of group practice in the distribution of physicians in nonmetropolitan areas. Med Care 1976;14:808.

20. The American Medical Association. Profiles of medical practice, 1978:192.